PC

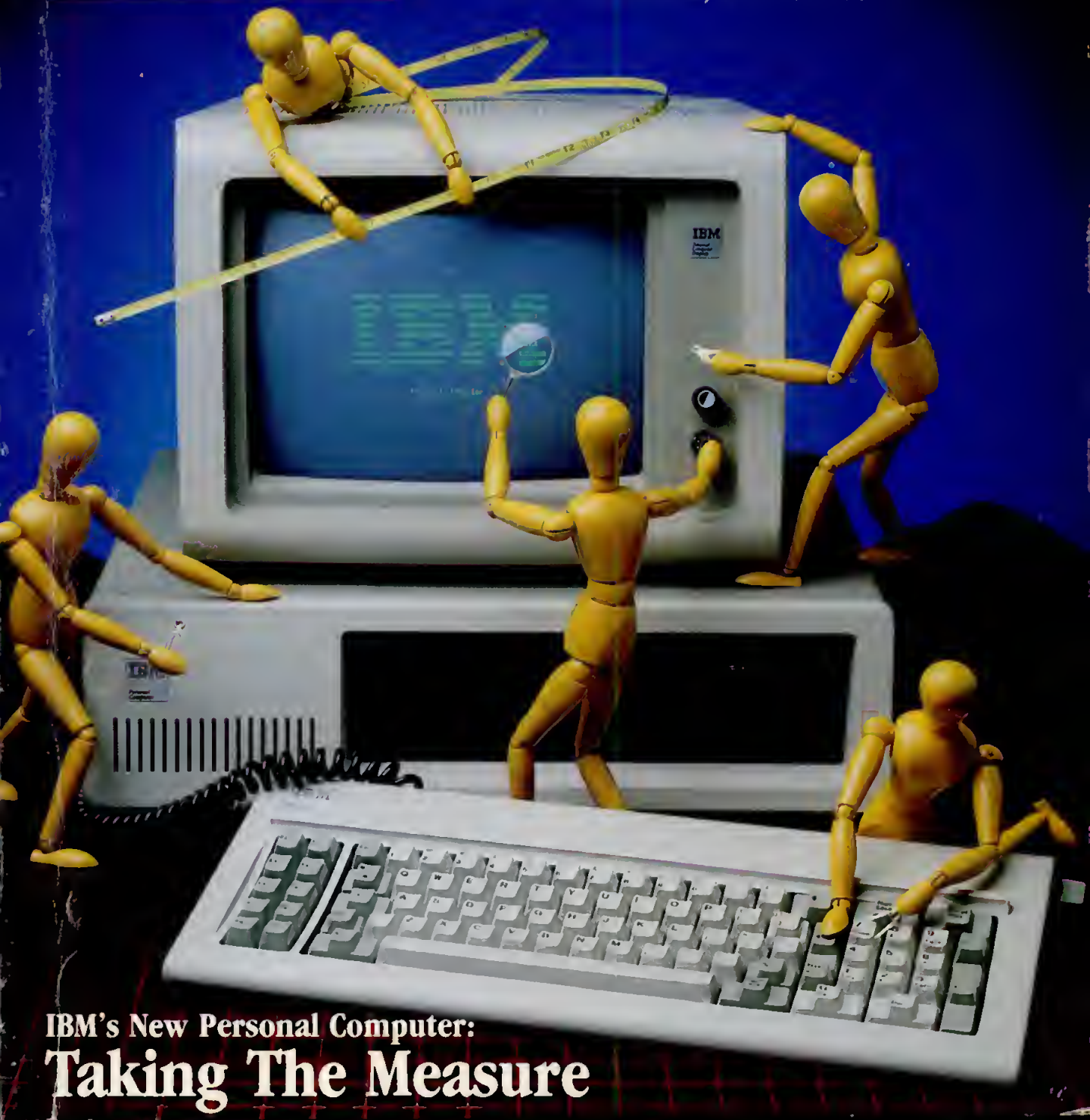
The Independent Guide to IBM Personal Computers

Charter Issue

The Man Behind The Machine?

"Not-so-Easy Writer" A User's Report

Product reports: TecMates, Mathemagic, Visi-1040, The Freedom Network, and more. . .



IBM's New Personal Computer:

Taking The Measure

Presenting the IBM® of Personal Computers.

IBM is proud to announce a product *you* may have a personal interest in. It's a tool that could soon be on your desk, in your home or in your child's schoolroom. It can make a surprising difference in the way you work, learn or otherwise approach the complexities (and some of the simple pleasures) of living.

It's the computer we're making for you.

In the past 30 years, the computer has become faster, smaller, less complicated and less expensive. And IBM has contributed heavily to that evolution.

Today, we've applied what we know to a new product we believe in: the IBM Personal Computer.

IBM PERSONAL COMPUTER SPECIFICATIONS
*ADVANCED FEATURES FOR PERSONAL COMPUTERS

User Memory
16K - 256K bytes*
Permanent Memory
(ROM) 40K bytes*
Microprocessor
High speed, 8088*
Auxiliary Memory
2 optional internal diskette drives, 5¼", 160K bytes per diskette
Keyboard
83 keys, 6 ft. cord attaches to system unit*
10 function keys*
10-key numeric pad
Tactile feedback*

Display Screen
High-resolution (720h x 350v)*
80 characters x 25 lines
Upper and lower case
Green phosphor screen*
Diagnostics
Power-on self testing*
Parity checking
Languages
BASIC, Pascal
Printer
Bidirectional*
80 characters/second
12 character styles, up to 132 characters/line*
9 x 9 character matrix*

Color/Graphics
Text mode:
16 colors*
256 characters and symbols in ROM*
Graphics mode:
4-color resolution: 320h x 200v*
Black & white resolution: 640h x 200v*
Simultaneous graphics & text capability*
Communications
RS-232-C interface
Asynchronous (start/stop) protocol
Up to 9600 bits per second

It's a computer that has reached a truly personal scale in size and in price: starting at less than $1,600† for a system that, with the addition of one simple device, hooks up to your home TV and uses your audio cassette recorder.

For flexibility, performance and ease of use, no other personal computer offers as many advanced features to please novice and expert alike (see the box).

Features like high resolution color graphics. Ten, user-defined function keys. The kind of expandability that lets you add a printer for word processing, or user memory up to 256KB. Or BASIC and Pascal languages that let you write your own programs. And a growing list of superior programs like VisiCalc,™ selected by IBM to match the quality and thoughtfulness of the system's total design.

This new system will be sold through channels which meet our professional criteria: the nationwide chain of 150 ComputerLand® stores, and Sears Business Systems Centers. Of course, our own IBM Product Centers will sell and service the system. And the IBM Data Processing Division will serve those customers who want to purchase in quantity.

Experience the IBM Personal Computer. You'll be surprised how quickly you feel comfortable with it. And impressed with what it can do for you.

IBM®

The IBM Personal Computer and me.

For the IBM Personal Computer dealer nearest you, call (800) 447-4700. In Illinois, (800) 322-4400.

†This price applies to IBM Product Centers. Prices may vary at other stores.

VisiCalc is a trademark of Personal Software, Inc

When IBM® built their newest toolbox, they came to Microsoft for tools.

Leadership. When the world's leading computer manufacturer decided to enter the microcomputer world, they came to the leaders in microcomputer software: Microsoft. In fact today, Microsoft has provided more software tools for the IBM Personal Computer than any other software manufacturer.
Start with MS-DOS!™ When IBM chose the primary operating system for the IBM Personal Computer, they chose MS-DOS. They call it PC-DOS. It's a powerful, yet easy to use and understand operating system. And all software currently available for the IBM Personal Computer runs under PC-DOS. It's IBM's principal DOS for the Personal Computer.
Next, languages. Microsoft 16-bit Cassette BASIC is standard with the IBM Personal Computer. But Microsoft also provided 16-bit Disk BASIC, Advanced BASIC, Pascal, FORTRAN, and utility software for the Personal Computer. For fun, we added the Microsoft™ Adventure game. For self-improvement ...Typing Tutor.

Why Microsoft? Microsoft virtually invented microcomputer software when we put BASIC on the first personal computer. Since then, we've developed a full range of languages, utilities and operating systems. Software that has become a standard for the 8-bit world. Software that is becoming the standard for the 16-bit world. That's why the world's leader in computer hardware came to Microsoft, the world's leader in microcomputer software.

MICROSOFT

Microsoft, Inc.
10700 Northup Way • Bellevue, WA 98004

A void has been filled!

MatheMagic™

Transforms your microcomputer into The Ultimate Calculator.

Now, a unique software product enables you to use your computer for sophisticated mathematical calculations — without any programming.

MatheMagic™ spans numerical processing from the simple to the intricate. Yet remains flexible and easy to use. A helpful tool in the office, laboratory, classroom or in the home.

MatheMagic™ features a menu-driven format, easy to create user-defined variables and formulas, instant disk storage and recall, unlimited use of formulas within formulas "what if" calculation repeat facilities and printer support.

Compatible with Apple II or II+, Atari, TRS-80 Models I & III, TRS-80 Model II CP/M, CP/M (Z-80), Commodore PET/CBM, and IBM PC.

International Software Marketing
Suite 421, University Building
120 E. Washington Street
Syracuse, New York 13202 U.S.A.
Tel: (315) 474-3400

Hayden House
5-6 Millmead
Guildford, Surrey GU2 5BZ England
Tel Guildford (0483) 503603

Price — Under

$100.00

Retail

MatheMagic™

There is nothing else like it on the market!

Distributor inquires invited.

AS AN AUTHOR THIS MIGHT BE YOUR MOST IMPORTANT LINE.

If you've tried to market your own program, you've probably run into a virtual brick wall of problems. Problems that require time, energy, funds, personnel and expertise to solve.

Lifeboat Associates invites you to bring your problems to us. That way you can do what you do best: create quality software. And we can do what we do best: sell it.

As an international publisher of quality computer software with a strong relationship among business, professional, programming and personal computer users, as well as micro- and minicomputer OEM's, Lifeboat Associates has sold and fully supported more software programs by more authors for more machines to more users in more countries than anyone else.

And we do a lot more than sell. Lifeboat also provides:

• Full after sales support • A multitude of media formats • OEM sales • Extensive promotional campaigns through Lifeboat's *Software Desk Reference*™, specially designed OEM private label catalogs, foreign catalogs, brochures, flyers and direct mail • Advertising • Advertising preparation • Marketing services throughout a wide network of affiliates, dealers and distributors • Translation facilities into foreign languages • Seminars • Typesetting services • And lots more

So if you've expended your time and genius in writing a great program, bring it to Lifeboat. We'll expend our time and genius in publishing it.

Write for a copy of the *Lifeboat Author Guide*.

Lifeboat Associates

World's foremost software source

1651 Third Avenue, New York, New York 10028

Keep up with the latest COBOL products for business applications

...with the Micro Focus Newsletter

Now, the Micro Focus Newsletter enables you to keep up to date with the latest COBOL products and applications. It's the kind of information you can't afford to be without – so ask us to mail you, starting with the current issue covering topics such as:

Mainframe COBOL capability...
...on the next generation of microcomputers. That's the promise of Level II COBOL.™ Currently being sold to major computer manufacturers, Level II COBOL implements seven COBOL modules to the highest level of the ANSI '74 specification...

Multi-user environments...
...such as bank-switched MP/M are now catered for by FILESHARE.™ Based on the IBM 8100 specification, FILESHARE provides total security for CIS COBOL™ programs updating shared files...

UNIX™ systems...
...can now run CIS COBOL and Micro Focus' source code generator, FORMS-2™ UNIX and CIS COBOL are natural partners for rapid application development...

Apple II CIS COBOL...
...provides one of the lowest-cost COBOL systems ever. Apple dealers are stocking it now, following world-wide distribution by Apple...

COBOL applications...
...are now available for a host of industries, and one transport industry user tells how he used CIS COBOL to achieve 'radical improvements in efficiency'...

Writing effective packages...
...on microcomputers presents new opportunities and challenges. A question and answer section shows the CIS COBOL solutions to problems that could be bugging you...

In Japan...
...CIS COBOL is now distributed by the leading supplier of microcomputer software, and has been bought by six computer manufacturers...

To receive our newsletter – mail this coupon (or your business card, marking it Newsletter Offer) direct to us:

MICRO FOCUS

Micro Focus Inc. 1601 Civic Center Drive, Santa Clara, Ca 95050. USA.
Phone: (408) 496 0176. Telex: 278704 MFCIS UR

Micro Focus Ltd. 58 Acacia Road, London NW8 6AG, England. Phone: (01) 722 8843.
Telex: 28536 MICROF G

Please mail me
the Micro Focus Newsletter

Name .....

Title .....

Company .....

.....

Address .....

.....

.....

PCommuniques

A compendium of facts, news, opinions, rumors, gossip, inside intelligence, speculation and forecasts about IBM Personal Computers.

"A Very Different IBM"

An executive of an independent software company that is developing application programs for IBM Personal Computers recently shared with *PC* some experiences of IBM's willingness to work with non-IBM program marketers. Though the comments seemed favorable, the speaker shall, at his/her own request, remain nameless.

"It's a very different IBM," said the software developer. "They at least listen when yuu call on the phone."

"We went down to see them, and they tuld us, 'We don't want to develop software for this machine ourselves.' They were very open and helpful about giving us the technical information we needed. The feeling was so radically different—it's like stepping out into a warm breeze."

"They really want to cooperate. After years of hassling—fighting the Nut-Invented-Here attitude—we're the gods."

"Billion Dollar Baby"

The above figure suggests Future Computing, Inc.'s assessment of the IBM Personal Computer's economic impact. *IBM's Billion Dollar Baby* is also the title of a 155-page report by Drs. Portia Isaacson and Egil Jullussen, of the Richardson, Texas, consulting firm. Actually, the title is conservative compared to the figures inside. Amnng the forecasts the report offers those who pony up the $450 asking price:

- Based on pruduct demand estimated by surveying key computer stores, the retail value of IBM's PC hardware sales will grow from $360 million in 1982 to $2.3 billion in 1986.
- Retail value of IBM software sales will grow from $85 million in 1982 to $700 million in 1986.
- Meanwhile, over the same period, PC-related sales of hardware from other companies will grow from $65 million to $685 million, and related sales of software from other parties will rise from $15 million to $395 million.

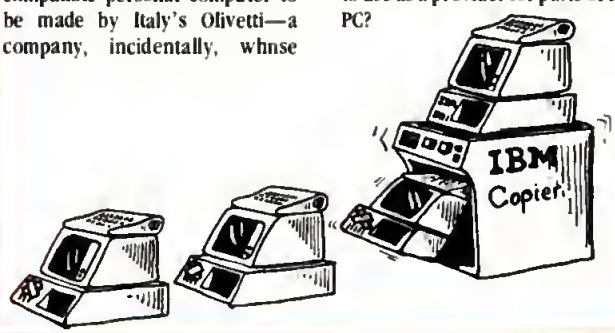
The tutal for all the above categories will exceed $4 billion by 1986, Future Computing says.

Lookalikes From Home & Abroad

Perhaps expecting that IBM won't saUsfy the demand of all who want to buy—or sell—IBM Personal Computers, at least three companies are said to be preparing "lookalikes." One, reportedly coming from Lee Data, a U.S. company, is purported to be compatible with all PC standards, from the disk drives on up.

Then there have been murmurs in the trade press of a PC-cnmpatible personal computer to be made by Italy's Olivetti—a company, incidentally, whnse typewriters are sold through some major retail chains. But the Atlantic isn't the only ocean that may have PC lookalikes crossing it.

Rumor has a PC lookalike well alung in the works at a Japanese manufacturer. This machine, naturally, wouldn't have IBM's name and reputation to help sell it. But, as a countervailing point, what if the maker could argue that it was a cnmpany IBM itself trusted enough to use as a provider for parts of the PC?



IBM Employees Snapping Up PCs.

From the subscription orders pouring into *PC* in IBM envelopes, and from the news *PC* keeps hearing about sizeable IBM-employee Personal Computer Clubs, it's clear that interest in the PC from within the IBM family is substantial. But just how substantial?

In the December issue of *Tbink*, an IBM cumpany magazine, the number of employee PC orders is put at 10,000. A phone call in October from a *PC* Informant claimed 30,000 IBM employees had placed orders for PC systems. At the COMDEX trade show, a number mentinned by more than one visitor to the *PC* exhibit booth was 40,000 employee orders. And just before press time, a note hand-scrawled un notebook paper by an anonymous, self-described IBM employee arrived in our mail. It claimed more than 60,000 IBMers had pul in urders for PCs in the first month of the company's employee offer.

Whatever the number, two possihle reasons suggest themselves: some employees may hope to capitalize nn an anticipated scarcity and IBM's said-to-be-generous employee deal (according to one report: haif price, with 2 years to pay through payroll deduction) by reselling for a profit. Others more likely are eager to use their PCs to begin writing programs for submission to IBM's software marketing operation. (That, by the way, is the only channel which employees will be permitted to use for selling their PC creations, according to another source.)

Our loose-leaf correspondent said employee deliveries were going to start last December and be completed by Septemher of '82.

ARCNET Connection Coming?

Word has reached *PC* of a plug-in module under development that will allow connection of IBM Personal Computers to the ARCNET local area communications network manufactured by Datapoint Corp. ARCNET is the local network scheme adopted by Tandy Corp. fur connecting their TRS-80 Model II computers together and hooking them up to other devices such as high-capacity mass stnrage. It also allows the Radio Shack computers to work together with larger computers made by Datapoint. If an ARCNET module for PCs is introduced, it could provide a connection allowing IBM PCs and TRS-80 Model IIs to be mixed together in an integrated system.

PCommuniques

PC Clubs Forming Fast

At least four groups have already been organized for people who have an interest in IBM Personal Computers. The groups' scope ranges from local to regional to national.

Two of the clubs have been formed by employees at IBM facilities, one in San Jose, California and the other in Austin, Texas. The first regional group to come to *PC's* attention is based in the Philadelphia area. And the national group, which has taken the name "Autumn Revolution '81," is headquartered in Tulsa.

Many other groups may already have formed, and many more are likely to appear in the future, and *PC* would like to hear about them. (Drop information to "Clubs," PC, 1239 21st Avenue, San Francisco, California 94122.) Addresses for those we know of so far are:

Philadelphia Area IBM PC User Group
c/o Craig Uthe
4101 Spruce Street
Philadelphia, PA 19104

The IBM Club
c/o David Andrews
310 Honey Tree Lane
Austin, Texas 78746

IBM PC Users Group
c/o Lee Wersel
7255 Orchard Drive
Gilroy, California 95020

Autumn Revolution '81

Autumn Revolution '81, an independent users group for the IBM Personal Computer, has opened its national headquarters in Tulsa, Oklahoma.

According to organizer Dan Perry, the group already has several thousand members across the nation. Autumn Revolution '81 is "dedicated to its members and to the development and application of the capabilities" of the IBM Personal Computer.

Membership is $30 for one year and $55 for two. The announced benefits include a subscription to the club's monthly newsletter, access to an IBM PC software library, access to a technical library, user training and use of a "technical hotline"—a toll-free number members can call and, for a fee of $1 per minute ($5 minimum), receive user information from a qualified technical person.

Autumn Revolution '81 makes it very clear in its literature that its intentions are highly ethical. The group does not "condone software piracy and other practices intended to undermine or circumvent the honesty and creativity of the persons engaged in the personal computer marketplace."

Autumn Revolution '81
P.O. Box 55329
Tulsa, Oklahoma 74155

Numberless PCs??

Some initial press reports about "The IBM Personal Computer" made quite a thing of its being "the first IBM product without a model number."

T'ain't so! The nice, silvery nameplate on the PC's front identifies it by name only. But on the back of the System Unit, near the power outlet, a matching silvery square discreetly announces the product as the Model 5150. (The number also appears on the specification plate.)

Thus, the PC can be interpreted as an nutgrowth, at least in IBM's eyes, of IBM's earlier models 5100 and 5110. Oh well...it's been known to happen before—dumb, stolid parents having a bright, personable kid. (And the kid not wanting to talk much about his parents.)

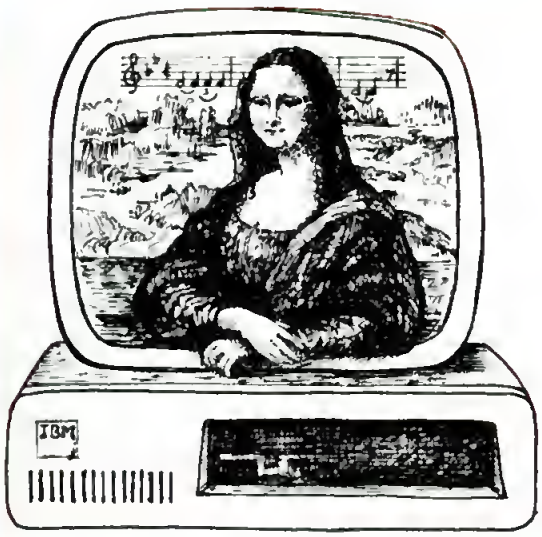
Bar Code Decoded

Been wondering about the bar-code label on the back of IBM Personal Computers—the one that looks something like those on cans of peas? No, you won't see PCs for sale in the supermarket (Yet!) The bars are used in the factory for production control. Each PC has a unique label, and each work station in the IBM plant has a label reader. Every time a PC is moved to a new stage in assembly, the readers are used to report the move to a big computer keeping track of the production process. From this information, a complete who-what-when production history is developed for each unit. If problems crop up, IBM hopes this system will help cure them fast.

PC Production Guess

As you can tell, the topic of the IBM Personal Computer is one with great potential to set tongues wagging. The owner of one such tongue phoned the *PC* offices to give an unverified report about the number of 8088 processor chips IBM had ordered from Intel (the chip's manufacturer). The caller asserted IBM had committed for a minimum of 150,000 chips in 1982, with options to take the order as high as 225,000. Our caller also commented that, to his knowledge, the Personal Computer is the only IBM product using that particular chip, and that we could draw our own conclusions from there.

Program Generator Does Graphics, Music



"Program generators"—programs that help users write other programs—have recently appeared on the microcomputer scene, with varying levels of sophistication and power. (One heavily advertised version is called *The Last One*.) In general, these are only capable of creating programs that do traditional number-crunching and file handling. But Advanced Operating Systems, an Indiana company, has announced the imminent debut of a product in this vein for the IBM Personal Computer—with a special twist. The company's program generator will have full access to the graphics and music features of the PC. Release of the program could come early in 1982.

PCommuniques Pays.

Are you in possession of information you think should appear in *PCommuniques? PC* pays $50 for each contribution published in this section. Submissions must be signed, but anonymity will be preserved upon request. All submissions become the property of *PC* and are subject to editing. For payment, you must include an address and phone number. Write to "PCommuniques," 1239 21st Avenue, San Francisco, California 94122.

Jason McDonald has a competitive edge on the market, right in his own home.

You can have all the financial information you could only get from your broker, right on your home TV screen. How? With a low cost terminal or microcomputer and CompuServe's **financial services.** We have a data base that is now serving thousands of customers throughout the United States with the very latest information on stocks, commodities, bonds and most of the name business and financial publication sources required to keep abreast of today's competitive markets.

Just look at the financial information that's available through the CompuServe Information Service network. At home. On your TV screen.

MicroQuote: current and historical data on more than 40,000+ stocks, bonds and options. Includes volumes, dividends, earnings per share, ratings and shares outstanding. The information is updated daily.

Commodity News Service: pricing, news and commentary on energy, metals, financial instruments and agricultural commodities. Also weather, agricultural and economic news.

Standard & Poor's General Information File: selected items of information from S&P's NYSE, ASE, and OTC Stock Reports on over 3,000 corporations.

Financial pages of major regional newspapers: electronic editions of major daily newspapers including The Washington Post, The New York Times, The San Francisco Chronicle, plus the AP financial wire.

Raylux Financial Advisory Service: business outlook, financial commentary, stock market outlook, securities glossary and industrial outlook model.

Value Line Data Base II: CompuServe provides access to fundamental financial information on more than 1,700 public companies.

Fintol: personal financial programs.

How much does it cost?
The basic charge is $5.00 an hour from 6 PM to 5 AM local time weekdays, and all day weekends—billed in minutes to your charge card. MicroQuote, Standard & Poor's and Value Line are extra cost options. You can access the CompuServe Information Service with a local phone hook-up from more than 260 U.S. cities. For hardware you need a terminal or personal computer and a modem.

There's more.
Along with the financial services, you get all the rest of the CompuServe Information Services: AP news and sports wires, electronic editions of major daily newspapers, games, electronic encyclopedia, government publication data, travel information, valuable consumer and home-related information, entertainment features, electronic mail, nationwide bulletin board, newsletters from computer manufacturers—and more!

When your broker's not available, we are. CompuServe's Information Service can give you a competitive edge. Get a demonstration of the CompuServe Information Service at a Radio Shack® Computer Center or many Radio Shack® Outlets. Or for more information write "Financial Information" at the address below.

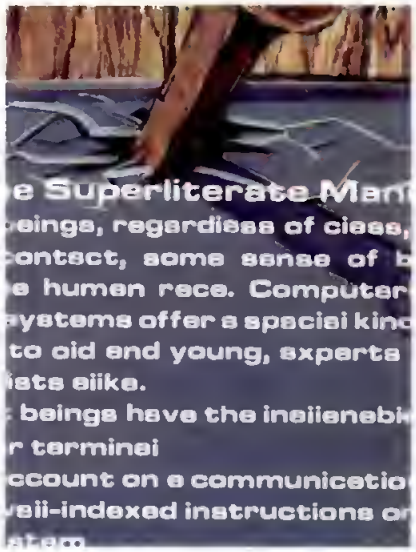
Radio Shack is a trademark of Tandy Corporation

CompuServe

Information Service Division
5000 Arlington Centre Blvd.
Columbus, Ohio 43220
(614) 457-8600

42

16

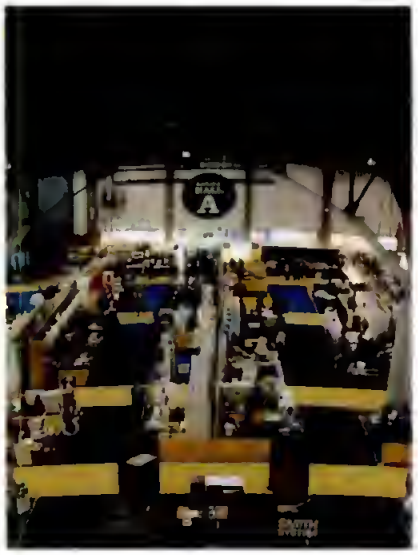


26

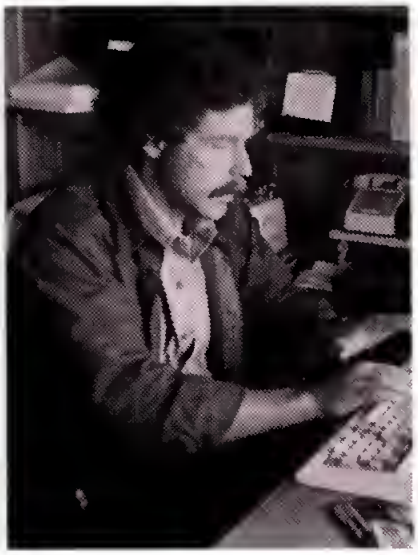
IN THIS ISSUE

Publisher & Editor-In-Chief: DAVID BUNNELL **Editor:** JIM EDLIN **Design Director:** JAMES McCAFFRY **PC-Lab Director:** DR. LARRY PRESS **Communications Editor:** CLIFFORD BARNEY **Associate Editors:** HAL GLATZER, JEREMY JOAN HEWES, CARL WARREN **Programming Editor:** KARL KOESSEL **Contributing Editors:** EDDIE CURRIE, DR. REBECCA THOMAS, JEAN YATES **Copy Editors:** SUZANNE CLUPPER, MICHAEL CORRIGAN, BILJANNA SIVANOV **Art Staff:** LAUREL PHILLIPS, MICK WIGGINS, MICHAEL ZIPKIN **Staff Illustrators:** LINDA HARRISON, DON NACE, LINDA NACE **Staff Photographer:** JACQUELINE POITIER ■ **Director of Marketing & Sales:** CHERYL WOODARD

Cover Photo by Jay Carlson



54



64

72

PC: The Independent Guide To IBM Personal Computers
Premiere Issue—Volume 1, Number 1—February-March 1982
(ISSN applied for.) Published bimonthly by Software Communications Inc.
Editorial and Business Office: 1329 21st Avenue, San Francisco, California 94122 415/753-8088
CompuServe 70370,532

Subscriptions: Within USA—six issues for $12. Elsewhere—six issues for $24, air delivery (please remit US funds).

David Bunnell

FLYING UPSIDE DOWN

CONCEIVED SHORTLY AFTER IBM ANNOUNCED ITS PERSONAL COMPUTER on August 14, 1981, *PC: The Independent Guide to IBM Personal Computers* was realized in its present form by the vision and determination of those who have contibuted to it.

WE LAUNCHED OUR PROJECT OCTOBER 1, 1981, and six weeks later exhibited our Preview Issue at the Comdex Computer Show in Las Vegas—alleged to be the biggest computer industry show ever. Our PC booth was mobbed for the entire four days of the event. There was a great deal of interest in the IBM Personal Computer sitting on our counter (running the BASIC demo programs), the opportunity to enter our subscription giveaway, and the magazine itself.

We left Comdex in high spirits, and got back to home-base San Francisco just before Thanksgiving. We immediately launched the parallel processes of selling advertising, setting up dealers and putting together the actual editorial content.

Along the way we established a production flow, contracted with the best printer we could find, made plans for fulfillment, set-up a subscription sweepstakes, garnered in the best writers in the business, and proceeded with all of the many other tasks of magazine publishing.

There are good magazines and there are bad magazines as well as successful and unsuccessful ones. We strongly sense that the users of the IBM Personal Computer will demand quality end-user publications filled with useful, well-written information. It is our destiny to be the first such publication and our intention to always be the best.

We unabashedly aspire to that elite set of sensationally successful magazines—*Rolling Stone*, *Playboy*, and *BYTE* are recent examples—that seem to magically combine concept and timing in a brew which results in a dizzy success cycle that no business plan could ever account for.

When you get into the business of pure dynamic change, as we feel we have been in at *PC*, you open up full-throttle and operate largely on instinct. As Tracy Kidder put it in *Soul of a New Machine*, you "fly upside down."

So, we come to you flying upside down.

Fortunately for *PC* and our readers, the *PC* crew is mostly combat vets.

Still, it's the things you don't anticipate which cause the most aggravation. Ironically, in the end they are often the source of our most humorous memories. The whole day before the Comdex show in Las Vegas provided the *PC* crew with several such examples.

The plan that day was that our Marketing Director Cheryl Woodard and myself would leave San Francisco on a morning flight. Upon arriving at Las Vegas we would pick up the rented station wagon, drive to the two hotels we were booked into, check in luggage for ourselves and for Editor Jim Edlin and Staff Photographer Jacqueline Poitier, and then drive over to the Convention Center to make sure our booth was properly setup.

Meanwhile, Jim and Jackie, scheduled on an afternoon flight were driving around San Francisco picking up signs and printed material from a half dozen shops. They would bring these things with them which explains why Cheryl and I brought their luggage.

The first thing that went wrong was that the hotel had no record of my reservation and all the rooms on the Strip were booked for the weekend.

The second thing that went wrong was minor, really, which was the color of the carpet at our booth was red instead of blue. That and the fact they forgot our furniture.

The third thing was that when Cheryl inquired about the furniture she discovered that the people who staff Comdex had never heard of us.

The fourth thing was that Jim and Jackie picked up all the printed material OK but missed their plane. They could see it pulling away from the gate as they dashed into the boarding area.

Finally when it seemed like everything had been pulled back together—the situation at the exhibit hall was straightened out, the hotel reservations were verified, Jim and Jackie got on an evening flight and

Linda Harrison

arrived safely in Las Vegas laden with signs, envelopes and business cards.

We had one remaining chore, which was to pick up 6,000 copies of our *PC* preview brochure from the PSA airline counter. Upon arriving we instantly sighted several boxes marked "PC" stacked behind the counter. That was a source of collective relief.

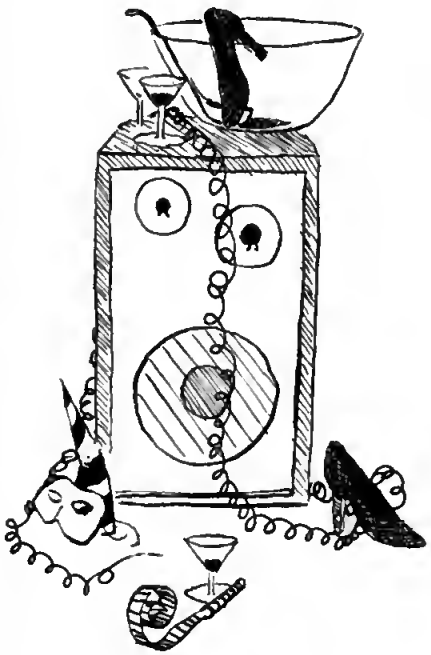
The rest would be easy—or so we thought.

However, bingo, Murphy again, the airline lost the freight bill. The rudely mannered clerk behind the counter was afraid to release our material to us. Without the air bill he had no record of who shipped it or if it had been paid for. It was near midnight, too late to call the printing company in San Francisco to get the air bill number.

Clearly, it wasn't our fault if they lost the air bill. For a good 40 minutes we discussed the situation in great and sometimes heated detail with this surly, overgrown boy of a clerk. At one point Jim Edlin and I more than half-heartedly considered wrestling the packages away by force. Hadn't we had enough for one day?

Finally, the clerk sensed our hostility and wisely determined it wasn't worth any more hassle. He let us have our brochures. We gleefully drove away, the station wagon loaded down under the weight of 6,000 pieces of slick literature. We were punchy as hell. We were flying upside down.

THE PARTY IS OVER . . . .



DON'T BE MISLED BY SPREAD-SHEET PROGRAMS MASQUERADING AS A BUSINESS PLAN.

Most of the _____CALC like programs are specfacular displays, but so are fireworks — and they are abouf as illuminating as a Roman Candle for business planning.

CRYSTAL BALL™

A PROFESSIONAL PLANNING SYSTEM FOR PROFESSIONAL PLANNERS

- The forecasting is accurate and consistent, taking into account seasonability, trend, and nonlinearity.
- Handles monthly, quarterly, weekly, daily data.
- Provides linear relationships betwaen and among all your variablaa. This means more accurate impact of "what if?" questions than the leading spraad shaet programs.
- Automatic sensitivity analysis built in.
- Its riak-analyais aaction provides businass managamant information in a form that the big boss needs to approve a business plan; namely, how much risk is there in this plan?

IF YOUR BUSINESS NEEDS PROFESSIONAL BUSINESS PLANNING, YOU NEED

CRYSTAL BALL™
For the IBM Personal Computer.

SOFTWARE
SOFTWARE
DIGITAL MARKETING
DIGITAL MARKETING™

2670 Cherry Lane • Walnut Creek, CA 94596
(415) 938-2880
Telex #17-1852 (DIGMKTG WNCK)

Dealer Inquiries Invited

Crystal Ball trademark of Half Moon Bay Trading Co
CP/M trademark of Digital Research

CRYSTAL BALL requires 48K RAM, and IBM Personal Computer.
Soon available for Apple II or CP/M
Price is $295 Manual alone — $30

Zero Base Thinking/Jim Edlin

CONFESSIONS OF A CONVERT

I HAVE WHAT I BELIEVE WAS THE BEST personal computer of the pre-IBM era, though you've probably never heard of it.

It's called a Compucolor II, made by a Georgia company named Intelligent Systems Corp. I'm using it to write this column. If inspired design were all that counted, the Compucolor II ought to have enjoyed the success that went instead to the Apple II. But while Apple had a mostly pale and limited design (though not without a spark of inspiration here and there) Apple did have plenty of inspiration in all facets of its marketing and management. And the Compucolor, with its brilliant design, was afflicted by massive incompetence in the apparently more-vital management and marketing departments.

I mention all this because, though the guiding principle in IBM's design of its Personal Computer appears to have been, "Make a better Apple II/iII," I have a strong suspicion that someone influential in the PC's design had more than a nodding acquaintance with a Compucolor II. Many of the PC's features, such as the design of the color/graphics display, echo the Compucolor more than the Apple. It is this discovery that has helped to turn around my views on the IBM PC.

Initially, you see, I was quite hostile to the notion of the PC. Partly this had to do with resentment toward IBM's latecoming into personal computers, and revulsion at the alacrity with which their entry was greeted. I thought personal computers were doing quite weil without IBM, thank you very much, and was repelled by the fawning welcome the personal computer world gave IBM's belated "blessing." But my objections went deeper than that.

The truth is, I am no fan of computers. i love the power they can give people to do things, but I hate the mickey-mouse they often make people endure to employ their powers. While there was once good and necessary reason for most of that mickey-mouse, I think advancing technology has made it largely obsolete. Most of it, I think, now lingers from inertia and force of habit.

Personal computers were slowly growing away from the old, computery traditions, and I feared that if iBM entered the market, ultimately perhaps to dominate it, they would redirect personal computers back into the computer mainstream they embody. I didn't want to see that happen.

Jacqueline Pehler

Still life of an editor with two computers.

I thought personal computers were doing quite well without IBM, thank you very much.

Now that I have become better acquainted with IBM's new machine, and the company's new policies, I no longer fear that outcome. it is clear to me that IBM has designed a machine for the future. They have published a technical manual giving away in detail the secrets of their machine. And in that manual's pages one can read everywhere the deliberate effort IBM's designers have made to avoid hemming in the PC's future evolution.

By no means am I saying I'm altogether delighted with the PC in its first go-round. Among other things, I remain disappointed that IBM hasn't made high-resolution color display the standard rather than an option for the PC. I remain disappointed that IBM didn't choose to encourage communications by building a direct telephone connection jack into every PC. (Both these choices would have forced desirable economies of scale.) And i'm still disappointed that IBM settled for an operating system not much advanced beyond the unfriendly qualities of CP/M. But i no longer fear that IBM's initial design choices will set the standard.

Whether IBM intended it or not, Pandora's box is now open. By both design and policy IBM has created an "open system." They have thus insured that if they dawdle about actualizing the potential of this machine, others will keep them honest.

I once dismissed the IBM PC as a "me too" machine. At the present moment, that is pretty much the case. But I now suspect it is "me-too" at the start of its evolution, compared to machines approaching the apex of theirs.

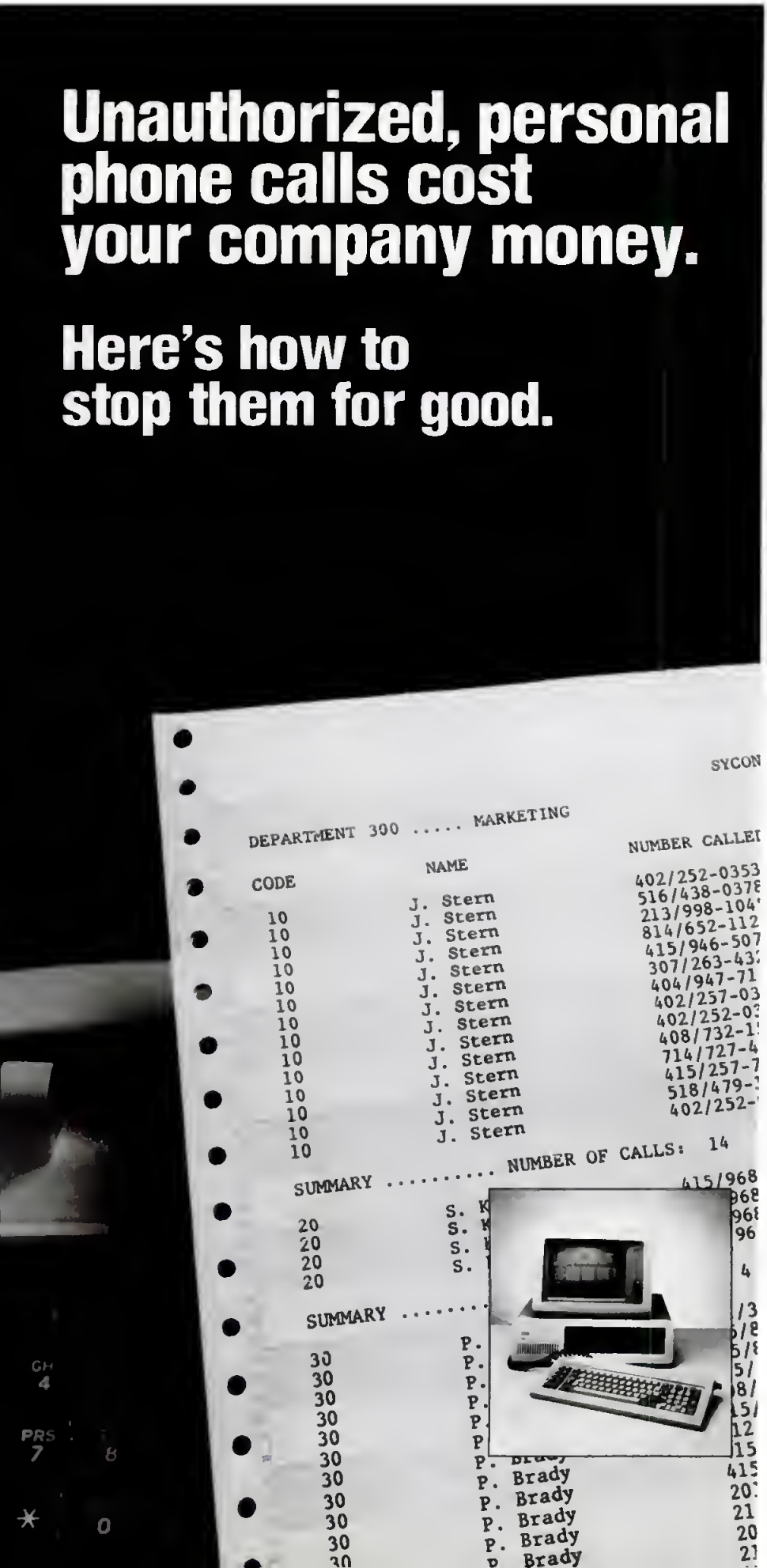
I'm not quite ready to put my Compucolor iI away. But I can see it won't be long.

PS—To answer in advance all who may be confused: No, I have no connection with the Microsoft line editor which seems to have borrowed my last name.

–JE

Unauthorized, personal phone calls cost your company money.

Here's how to stop them for good.



To many companies, reviewing the monthly phone bill is an irritating process. Who's making all those calls to places where you know you don't have business?

Our Phone Chronicle now offers you a surefire way to eliminate costly, non-business calls while bringing you other positive control benefits as well.

Phone Chronicle is the versatile new accessory that further enhances your IBM personal computer. It automatically logs all outgoing calls into the computer memory with: date, time, length of call, number called and three-digit, individual employee code.

There's more. The Chronicle is a valuable management tool for allocating phone charges to your different departments and profit centers. In addition, it can quickly verify actual calls made—protecting you against phone-company billing errors.

Comprised of a single PC board, phone plug, cable, diskette, and user manual, the unit has an on-board memory of 100 calls. When memory is almost full, a signal is given. Operating power is supplied by the DC adaptor so that the unit continues to function even when the CPU is turned off.

Priced at just $395 per phone line (introductory offer) you're looking at the best business bargain of the year. By cutting personal calls alone, your investment (and more) is back within weeks.

For complete details, check and return our coupon. Dealer inquiries are welcome. (Phone Chronicle also available for Apple II.)

O.K. Send information on:

- ☐ Single line Chronicle
- ☐ Multi-line Chronicle (available soon)
- ☐ IBM Personal Computer Advanced Systems Designer Training Course

Name _____
Title _____
Company _____
Address _____
City _____
State _____ Zip _____

Sycon Inc.
3040 Scott Blvd.,
Santa Clara, CA 95050
(408) 727-2751

sycon INC.

LETTERS TO PC

HOW THE HECK, YOU MAY WONDER, DOES A BRAND-NEW MAGAZINE GET LETTERS To The Editor to print in its Premiere Issue? Well, we considered making them up. Then we thought maybe we'd try printing Letters From *The Editors this first time around. Next, as good citizens of the microcomputer age, we got the bright idea of soliciting "letters" to our electronic mailbox on the CompuServe Information Service; but nobody replied. Then, to our surprise and pleasure, good old-fashioned letters started showing up attached to people's subscription orders, ad orders, and even just by themselves. So, however paradoxical it might seem, what follow are the real thing. We just figured you'd like to know.*

Report From The Front

I think the IBM PC will bring a lot more people into personal computing. My wife and I are typical of one group. We both consider ourselves professional computer specialists. We had been eyeing a personal computer, but what was available seemed little better than extended toys. There was little feel that the available personal computers were designed to be tools.

My wife and I are software specialists who want the hardware to be transparent to us. The PC gives us this. The system has worked correctly since we plugged it in the first time. Enhancing the hardware does not require an EE degree; adding new pieces requires that you can read and follow simple directions.

The system is quite advanced and gives us capabilities that we don't have on some minicomputer development systems we use. The potential for expanding the system is impressive.

Now for our disappointments. Two months receiving our PC we don't have the 64K memory board to bring us to 128K, which means we cannot use PASCAL. We don't have the word-processing package yet and we don't have the communications hardware and software we ordered. We are annoyed and actually suffering from the lack of these pieces. One motivation for buying the IBM PC was to use it as a word processor for a book I am writing. I'm still writing by hand on legal pads. We hope these pieces don't become another 3830 for IBM (a super disk drive announced two years ago and still not delivered).

The other problem is dealing with ComputerLand. Generally, the ComputerLand people are concerned and helpful, but only to the limits of their knowledge. They do a good (not excellent) job, but a little professionalism like that of their grey-suited brethren would go a long way.

Well, we thought we would send you some news from the front. We are sure your efforts will be a success and have enclosed our subscription order.

Bob Fritz
Computer Sciences Corp.
San Diego, California

Editorial Advice

OK *PC*, I'm interested enough in the IBM personal computer and in your magazine to say "here is my 12 Bucks." As long as I'm subscribing I would like to include a few comments. I sincerely hope that your publication will be involved with more than just applications software. While articles submitted by users and objective reviews of professionally produced programs are invaluable to your readers, I think you can provide an equally important service to a large segment of your prospective readership by including articles about the hardware and system software. To have an in-depth understanding of a system can turn a fun or useful object into a powerful, creative tool.

I expect that a system with the name IBM will attract a great deal of interest from users and non-users alike. And I suspect you will have great success as long as IBM and/or competitors are selling compatible systems. I wish you the best of luck.

Gordon M. Furman
Santa Barbara, California

We hope you find *PC's* Premiere issue a suitable response to your concerns. *PC* plans to cover hardware, software and all else that relates to owning and using IBM personal computers.

Kind Words

Having been in and around the publishing industry for some time (*Time, Inc., Newsweek, Inc., Saturday Review,* etc.), I know just how difficult and perilous a new magazine venture can be.

I also think I understand a good idea when I see one. *PC* is a good idea. Most new publications aren't. And happily, *PC* is manned by professionals. Something most new publications aren't either. Congratulations on your progress with *PC.*

Brice W. Schuller
Doyle Dan Bernbach Inc.
San Francisco, California

Forgive us, but we couldn't resist running one of these.

Best wishes in your new venture. I think that you are covering a system that is turning out to be a real tiger in the marketplace. It is highly interesting that you have an editor named 'Ediin'. Was he the father of the DOS editor? (Ha!) As for Cheryl Woodard, well, let's just say I think I'm in love!

John Graybill
Gaithersburg, Maryland

Cheryl (our Director of Marketing & Sales) says thanks, and wants to know if you're interested in a lifetime subscription.

. . . Unkind Ones . . .

Dear Editor . . . What I'd like to know is who let this David Bunnell character out of his cage anyway. He's the same clown who once wrote that the Altair computer could "control all the traffic lights in a major city." I bought an Altair and all I could get it to do was change the lights on its front panel. Lord knows what wild claims he'll be making about the IBM.

Jack Rowbar
Traffic Manager
Plains, Georgia

. . . And Reassuring Ones

We shall be very happy to work with you and your staff and provide information on the IBM Personal Computer for your new publication.

P.D. Estridge
Director, Entry Systems Business
IBM
Boca Raton, Florida

PC welcomes letters from readers. Write to: "Letters, PC, 1239 21st Avenue, San Francisco, California, 94122." Letters published may be edited for reasons of space or style.

Amdek

From picture perfect.
To letter perfect.

Amdek
Color-I
FCC/UL approved

Amdek
Video-300

At Amdek, we make monitors for people who demand state-of-the-art color. And for people who know that crisp, clear text display is an art in itself.

Our versatile Color-I 13" video monitor features standard NTSC composite input, front-mounted controls and a built-in speaker with audio circuit. Our popular Video-300 12" Green Phosphor monitor has an easy-to-read, non-glare screen, 18 MHZ band width and 80 x 24 character display.

Both offer easy portability, with lightweight cabinetry and molded-in handles. And both are fully compatible with most computer and word processing systems. So compare our performance with other monitors. Then compare prices. For quality and value, you'll choose Amdek.

NEW THIS FALL: our advanced high resolution Color-II monitor with interface board for Apple II compatibility. Color-II features RGB, TTL input and 560(H) x 260(V) resolution for crisp 80 x 24 character display and exceptionally sharp color graphics. Ask your dealer about an Amdek Color-II, Color-I, or Video-300 monitor today.

AMDEK

2420 E. Oakton Street, Suite "E," Arlington Heights, Illinois 60005 (312) 364-1180 TLX: 25-4786

The Man Behind The Machine?

A PC Exclusive Interview With Software Guru Bill Gates

HOW WAS IBM ABLE TO SO GAUGE THE PERSONAL COMputer market as to come out with a machine that both incorporates all the good features of existing personal computers and accurately points the direction of future ones?

PC Publisher David Bunnell had a hunch that the answer to this question was to be found in Seattle—home of Microsoft, the first personal computer software company.

His hunch was based on the fact that while several software companies were chosen by IBM to provide the initial software for the IBM Personal Computer, only Microsoft provided a complete range of software. This software includes the iBM Personal Computer Disk Operating System, MACRO-assembler high-level languages BASiC, Fortran and Pascal and even application programs (Adventure and Typing Tutor).

So Bunnell hopped a plane to Seattle to investigate for himself.

Sure enough Microsoft's involvement was total, day-in, day-out. For more than a year, 35 of Microsoft's staff of 100 worked fulltime (and plenty of overtime) on the IBM project. Bulky packages containing computer gear and other goodies were air-expressed almost daily between the Boca Raton laboratory and Seattle. An electronic message system was established and there was almost always someone flying the arduous 4,000 mile commute. While many other individuals and companies consulted with IBM during the course of "IBM PC" development, and most have intriguing yarns to tell, only one company worked with IBM in such an intimate and (especially for IBM) *unheard of* fashion.

Continued next page . . .

by
David Bunnell



"Before they came, they said, 'Hey, we may really do some business. It could be exciting.'"

The highlight of Bunnell's investigation was a fascinating two-hour exclusive interview with Bill Gates, president and cofounder of Microsoft. As it turns out Gates probably knows more about the IBM Personal Computer and its history than anyone (outside of IBM, of course).

DAVID: What can you tell us about Microsoft's involvement with IBM on the Personal Computer project? How it was initiated and what transpired, as much as you can reveal.

BILL: In the case of the IBM project we started off not really knowing what they wanted. They came out in July of 1980 and first talked with us on a very tentative basis as though they were just doing market research. They said, "Don't get too excited and don't think anything big is going to happen."

Then they talked about how something could be done fairly quickly if a machine was designed to run standard software. In fact, we found out later that behind the scenes different labs within IBM had been charged with looking into how they could get a project done on a very quick basis. The typical product design time for a large company like IBM, and they keep track of this, is a little over four years. That is partly because they do such a complete job, and yet, in the personal computer industry, which they had a desire to participate in, you really couldn't be competitive if you speced out your product in 1976 and sold it in 1980. You would be selling an Altair computer against an Apple II.

So they wanted to come up with some way of doing things a little differently. One of the development managers of IBM got a committee together, people from different laboratories, and told them to go out and research the issue. The people we met with were from the Boca Raton laboratory, simply putting together some thoughts, essentially about how to cheat, and their idea was to use software that already existed out in the world, and to use industry standard parts like the Intel microprocessor. So they went back and said that based on using that approach they could get something done in the order of a year.

My understanding is that some of the other groups put in proposals that involved emulating existing IBM instruction sets, and there have been a lot of rumors that one of the groups looked at buying a machine from Japan. In fact, one of our Japanese customers had us do some demonstration software that was probably for that lab that was looking at Japanese sourcing.

In any case, Boca Raton got the go-ahead sometime in late 1980 and they came out with a lot of people, about 12 people. Before they came, they said, "Hey, we may really do some business. It could be exciting." And then they said, "We have a lot of things to do, we'll have our technical team meet with your technical team, so let's do them in parallel. We'll have our legal team meet with your legal team, we'll have the purchasing team meet with your purchasing team, we'll have our technical team meet with your technical team, so we can do four or five things at once." Well, that is fine, but that's me who is going to do those things and I can do only maybe two things at once, so we're not going to be able to have five simultaneous meetings.

Anyway, they came out with 12 people, and we really got things going. We ended up making the hardware a little more state-of-the-art by putting new things in it that went beyond the cardinal rule of getting the project done in a year. But, you know, the second priority beyond getting it done in a year was to have a state-of-the-art machine and by using the 16-bit processor and doing some of the stuff in the graphics, I think everyone pretty much agrees that that was achieved.

DAVID: Why is it important to have a 16-bit processor?

BILL: That is one area where there is a lot of confusion because the standard thing in the industry nowadays is to say, "Who cares about what's inside the machine?" People are buying a solution, not a computer, which is absolutely true. They are buying things like word processing or Visicalc which is one of the applications IBM announced.

I think 16-bits is extremely important, and it is not because of speed, although if you sit down at an IBM machine and play with it a little while you will see that it performs significantly better than existing 8-bit machines.

The main reason for the 16-bit micro being advantageous is its increased address space. That sounds like a technical issue, but what it boils down to for the end-user is that we can do more complex software, with a better end-user interface, in a more transportable form than we have ever been able to do in what I call the "8-bit world."

When I say 8-bit world, I mean the 6502 microprocessor, which is the chip used in the Apple, the Pet and the Atari, or the most popular chip which is the 8080, Z-80 family used in the Xerox 820 machine, the NorthStar, Vector Graphic and many others. In those 8-bit machines there is one common characteristic, which is that the logical address space in the machine is limited to 64K bytes (about 64,000 characters of storage). You have to put the operating system, the program, the data, the graphics memory, if it is going to be efficient—all those things in a single 64K area. You get into some terrible problems where you have to write program code in a hard to maintain fashion to keep it small and in fact that is one of the things that Microsoft is doing absolutely the best job of, is writing stuff in a small amount of space. Its a fine art that we spend a lot of time on, because in 8-bit machines it really made a lot of difference. But this is no ionger our focus on 16-bit machines.

People also compromised in the end user interface with their packages because they simply could not get enough stuff in there, and finally the overall capability of the packages are also compromised because you want it to be able to run on all the 8-bit machines. For example, whenever we have put a new feature in BASiC such as good screen handling, which is something that we are working on now, people complain because any feature we put in takes away from the space available for an application.

Now in the 8088 (the Intel 16-bit microcomputer used by iBM), that limit, the logical address space limit, is for all practical purposes gone away. The chip is designed to address up to a megabyte (1 million characters). IBM's announced support for up to a quarter megabyte, that is 256K, and it is very much in the relevant range. In other words, that factor will make all the difference in terms of quality end user interface integrated software.

DAVID: Will your recently announced planning package, Multiplan, be integrated witb word processing?

BILL: Not in its initial release. When we first get an extra resource, we don't know all the ways we are going to be able to take advantage of it. All I can really say is the 64K barrier has been the critical constraint in terms of writing software in a transportable form and putting new features in. Now that we have the freedom, we can use some more creativity to take advantage of it. it's just iike high resolution graphics was on the Apple. When the Apple II first came out it had high resolution graphics, but for about three years, nobody wrote programs that would take advantage of it. The programs were low resolution and it was kind of bizzare to try to use that extra mode. But today, the Apple II is virtually defined by high resolution graphics. There is simply not an entertainment package around, or even a lot of the serious packages, that don't take advantage of that.

Just some indication of this is that the graphics memory in the IBM PC is right in the address space of the machine. What that means is you can directly manipulate those bits on the screen using any of the 8088 instructions. Particularly the string instructions can be used to great advantage to provide animation type effects up on the screen. We could not have done that on an 8-bit machine, because we would have used up that crucial 64K resource, whereas on the 8088 it is megabyte resource. We put it very high in memory, I think about three quarters of the way up, and so it is there anytime you want to use it.

Myseif and someone else here wrote most of the demo programs used on the IBM machine in a matter of about three hours, because the extra versatility provided by directly manipulable graphics allowed us to put commands in BASIC that let you get at the full power of the machine very easily. In the case of the Apple, anybody who knows how to do really good high resolution graphics has to be a guru and so there is what i call a "bits and bytes barrier" to getting in and using the machine. And so to do a good program, you have to be both smart about bits and bytes, and creative enough to create the program. it is a rare individual who combines both of those taients.

In the iBM PC we have iowered the bits and bytes barrier so we will tap into some people with additional creativity and understanding of how to do whatever the particular need is. We are getting rid of the generai need to get into the innards of the machine to make it really perform. The power of this machine is much more on the surface than an 8-bit machine could possibly deliver.

DAVID: Now tbat you are into the subject of graphics, tell us more.

BILL: Looking at the graphics, the things that I mean specifically are some of the simple verbs that have been added into the BASIC and I will highlight three of those. The CIRCLE statement is very straightforward, you simply state where the center of the circle is and what the radius is going to be and immediately the thing is drawn at an extremely rapid speed. Also, you've got a lot of other options, you can add it at the end of the statement, like start angle, and end angle, and aspect ratio. The default is simply to do a full round circle, and that is something that the user can get at and use, for example, to do pie charts.

Another statement is what we call PAINT. It is a very simple notion. You simply enter a point on the screen and its just like putting your paint brush down there and painting until you hit the edge of the screen or the border. Say you draw a white border and you want to paint until you hit white, so no matter what the figure you have there is, square or circle or crazy looking thing, it will use its paint brush and paint in until it finds those edges. As a default it paints in the same color as the edges, but if you provide an extra parameter you can paint with another color. So you could paint a white circle with a blue center, or, if you had some sort of a jagged line graph and you wanted to show it as an area, you find a point in the interior and it would paint that arbitrary figure.

PAINT is a single verb. It is quite simple and intuitive and yet its implementation is very hard. That brings through some of the power of this machine. You can paint a figure that's virtually the entire screen in about two seconds. Really, there is no way that that could have been done on an 8-bit machine. It may sound unimportant but when you really get into trying to do some of these new user interfaces, the so called Xerox Star-like interfaces that really are what is going to open up these machines to a wider user population, these graphics primitives are incredibly important. For example, when we put a little arrow up on the screen to point to things, we use a solid arrow, and to do that efficiently we have actually generated the thing with PAINT.

The final verb I wanted to mention is DRAW and this represents a philosophical

continued..

"If you sit down at the IBM machine and play with it a little while you will see that it performs significantly better than existing 8-bit machines."

decision we made a couple of years ago, which was that every time we put something new in BASIC there is a tendency to add a ton of verbs. In the case of graphics, where you are really adding verbs all of the time, and the user has a hard time remembering all of these verbs and each of them has its own individual syntax, and so that is a problem. The second problem is that if you use a bunch of verbs, then the description of a graphics object is not something you can read or write like a file. It is actually a program and so to move the embodiment of the graphics object around you have to move a program around. Well, that's a real pain, because in BASIC a program and data aren't treated uniformly and so you just get into big problems. What you'd really like is a simple way of using one of the data types already in BASIC to describe arbitrary graphics objects, and what we chose is the string data type. So now we have a simple single verb that gives you almost all the graphics capability and it is called DRAW.

Just to give one example, if you want to draw a box, you use the subverbs, which are R for right, L for left, U for up and D for down. So if I want a 10 × 10 square, I would enter DRAW, put a quote mark to indicate that it is a string, and go "R20 D20 L20 U20" and if I execute that it will draw the box. That is called Graphics Macro Language and the IBM PC is actually the third machine we have put that on. It has been extremely well received, and since using those strings you can write into a file or edit them or search for something inside them super easily.

That same concept has been used for music where it is called Music Macro Language, and so instead of DRAW you use PLAY. Enter PLAY "A, B, C" and it plays the notes A, B and C. It is true if somebody wants to specialize in them they have to learn the so-called macro language for that area, but it consists of really super simple commands and very self-contained.

Music is another case where I don't mean to pick on Apple—the only reason I use it is because it is an example of one of the most popular machines that has a lot of these capabilities and yet they are hard to get to. Once again, with music you have to be a real bits and bytes man to get that Apple to play any kind of decent tone. With the BASIC we have provided here, you can play something in legato, staccato or normal, just knowing a few simple characters that you type in under the control of BASIC. So we are pushing towards fulfilling the promise of these personal computers which is that anybody can just pick it up and use it—it's still not fulfilled but we are moving in the right direction.

"When we first get an extra resource, we don't know all the ways we are going to be able to take advantage of it."

DAVID: *We've been talking about things that IBM has done right which are significant. In your opinion, what are some of the things they have done wrong or not quite right?*

BILL: Well, you know in a way I am biased because of the depth of our involvement. I'd say it's a reasonably good balance, I mean in a way IBM is standing on the shoulder of experience that everybody else had in the industry—in a totally fair and good way, but it's not like 1976 when we didn't know what the market was and how to sell things. A lot of elements have been firmly established.

I have a wish list after we finish a project. I don't think cassette machines are super important and so I think the effort that was put into have a cassette interface wasn't worthwhile. I think everybody is going to run out of slots very quickly. The machine has a 5 slot limitation, but I suspect that an independent peripheral industry will start to do some combination cards that will reduce the pain of having a limited number of slots.

Everybody talks about how they'd like to have more disk space on the machine and of course I always like to see networking on a machine and nobody really has a good solution to that yet. It would be nice if there was a hard disk and I'm sure the independent vendors will come and put one of those on it.

It's possible to do a much better machine in a lot of ways from a hardware point of view. You could put a faster processor in. Intel's has the 8086. You could do a machine that is almost four times the performance. When Intel comes out with their 8087 chip, that will be a nice potential upgrade. I think IBM's Technical Reference Manual makes it clear they have an additional socket on there for that 8087 floating point processor but from my point of view, which is once again biased, the name of the game is software.

This machine will be significant because it will usher in a new generation of portable software which will be significantly better because of the speed, the address space, the instruction set, the underlying operating system, and the experience gained from the previous years.

I think five years from now the amount of software and the quality of the software on this machine will be incredible. It will dwarf what is available on mainframes, minicomputers and other machines.

DAVID: *I think we should talk a little bit about the operating system. Partly because I see a lot of confusion about MS-DOS and its retation to CP/M, and CP/M-86 more specifically. It seems that I read over and over again in the press that IBM has an operating system that is compatible with CP/M. Does it?*

BILL: Well, not really. There certainly is a lot of confusion about this issue. When IBM announced the machine on August 12 they said they'd be making available three operating environments. And the operating environment that we provided is know by IBM as Personal Computer DOS. We call it MS-DOS and Lifeboat Associates calls it SB-86. So we've got a lot of different names which adds a little bit to the confusion, but that's the operating system.

All of IBM's applications and languages that they're supporting run under it. In other words, VisiCalc only runs under PC DOS. The BASIC only runs under PC DOS, the Peachtree programs, and EasyWriter word processing package run under that. We've done some things there that are substantially different than has been done in CP/M. We did provide an upward migration path—in other words, we made it extremely easy if you've got source code and a translation package to move a CP/M-80 package up into the 8086 environment without worrying about the operating system interface. In other words, we emulate all the CP/M-80 calls because no doubt there is quite a wealth of CP/M-80 packages in existence. In fact the greatest installed base of CP/M-80 machines are the users of Microsoft softcards which plug into Apple computers. So we are probably as aware of that as anyone. Also I think we have more system software under CP/M-80 than any of the other vendors. So we made it possible to do that migration.

The move from 8-bit to 16-bit is an opportunity to improve things a great deal. CP/M-80 became a *de facto* standard in the 8-bit world. There is really no opportunity to change that—the 8-bit designers will essentially stop over the next year. The only chance to move up to a stronger

base is to grab this opportunity as we move into the new generation of processors.

Microsoft started out looking at 16-bit operating systems at the high end. About two years ago we went to Western Electric and licensed their Unix Operating System—which we have commercialized to a form known as Xenix. When IBM came along both from a technical point of view and other considerations it made sense for them to work with us on a new product we were doing which was a low-end operating system. So what we've got now is a family of operating systems with MSDOS at the low end and Xenix at the high end—really there's such a broad range of systems. From a single-user floppy system up to essentially a time sharing 16-bit system. We feel it is absolutely critical to have more than one operating system, although you have to have complete compatibility to move up along the line and add additional capability. That's what we have done with MSDOS.

DAVID: *Let's talk a little bit about IBM again. Who do you think the main customers are going to be for the IBM Personal Computer?*

BILL: I suspect that they will sell tons through their DPD sales force to large companies that have been looking at personalized work stations with local intelligence with a great deal of interest but too much fear to date.

The Apple II does not have enough communications capability and CRT capability to really be used in that mode. Until the IBM PC came along there was no product that could be offered to fill that need and I think that it is a huge market.

I've never heard any IBM estimates so I am just guessing here, but I think the majority of the sales will be through their DPD sales force. You know, Sears is doing a super job but they are only projecting five stores by the end of the year. No doubt Computerland will sell a lot of the machines but I doubt if they will be able to keep up with essentially the Fortune 500 demand from standard data processing departments.

DAVID: When do you think IBM will begin to sell through independent retailers?

BILL: All I know is what I read which is that towards the start of next year, they'll start to qualify additional retail vendors.

My understanding is that they will broaden their distribution. You know, IBM has to be admired for some of their conservatism. They only qualify the best and most professional groups to work together with them, because IBM is very afraid that somehow their overall corporate reputation is going to be hurt by what they are doing in this area.

DAVID: Still, IBM is doing some rather radical things, at least for IBM.

BILL: And it scares them that somehow that might hurt their image. So they went to Computerland, which is probably the leader in the independent dealer area. They gave *BYTE* magazine an initial exclusive on talking about the machine. They've really gone to the most established groups to do their work.

DAVID: How many machines do you think IBM will sell in 1982?

BILL: My guess is not based upon any inside information whatsoever but I think it will be not far from 200,000.

DAVID: Really?

BILL: If they can deliver them, the potential is there. I've heard numbers ranging anywhere from 100,000 to 150,000 so I am an optimist beyond the median point of that scale. They'll have to open up more distribution, though. I don't think Computerland can push through that many. And they may run into some production bottlenecks. There are a lot of outside vended parts on the machine and they are not going to compromise quality. Certainly at this point the machine is incredibly short, you know, we've got a ton on order and it is going to take a few months before they come in.

DAVID: Yes, we have the same problem. Let's move on to another topic, which we alluded to earlier. How does your soon-to-be-announced electronic spread sheet, Multiplan, relate to VisiCalc? Is it better?

BILL: Oh, certainly. It's a second generation spread sheet product. We'll be really going into that in our literature and it's a huge promotion thing for us—almost equal to all the promotion we have done for the entire company in its history, just for this one product. But, I'll just mention two things that are critical in Multiplan. The first is the use of naming. You are not put into a mode where you have to use "A10," "B9," "C14" and things like that, which you have to do with VisiCalc. If you want to say that taxes are 6% of sales then you say "taxes are .06 times sales." If you want the sum of all the profits you say "SUM (Profit)" and so we deal with data on a name basis which is the way people are used to dealing with it. The second thing is that we handle what we call Multisheet, which is a pretty obvious capability if you accept the analogy that these are spread sheet simulators. It is quite common to take numbers from, say, your cost sheet and your sales sheet and consolidate together. What you would really like is when you update the cost sheet it will carry over to the summary sheet. As soon as you look at the summary sheet, the information will be there. You don't have to type any commands or do any work every time you make the change to get the information over there. We have accommodated that capability.

One last thing, that I would like to mention also, is the way we have done the end-user interface. We've done away with slashes (/) and the need to know a lot of things about what is going on inside the package. For example, VisiCalc has a feature called "Order of Recalculation." The user has to think about does it go horizontally to recalculate or vertically to recalculate. Well, that's ridiculous. It's up to the computer to figure out the order of recalculation and not force you to figure out how you have to order your data so that things propagate through in the right order. That's a very technical thing.

DAVID: Are you doing other end-user packages?

BILL: The second wave is Multichart and Multifile which is data base and those will come out fairly quick in like three or four months, but anything beyond is easily six to nine months away.

DAVID: One thing you seem to be saying is that we are going to see a whole new set of application programs similar in concept to 8-bit programs only with a lot of improvements.

BILL: Right.

DAVID: Let's slip down the road five years. What are some of the real significant advances you see?

BILL: In five years the cost of computation will really be effectively decreased.

continued...

"We're still not at the stage where I'd tell my mother, or some naive person, just to go out and buy one of these machines."

We'll be able to put on somebody's desk, for an incredibly low cost, a processor with far more capability than you could ever take advantage of. Hardware in effect will become a lot less interesting. The total job will be in the software, and we'll be able to write big fat programs. We can let them run somewhat ineffeciently because there will be so much horsepower that just sits there. The real focus won't be who can cram it down in, or who can do it in the machine language. It will be who can define the right end-user interface and properly integrate the main packages. I expect over the next five years between us and others a heck of a job will get done. You'll be able to sit at your desk and do whatever it is you want to do with information or presenting data or interchanging data incredibly effectively. In other words, we will have changed the way people work.

At that time we'll just see the beginnings of the home information system, because it is so much harder to cost-justify that type of device. But I do feel that the "office of the future" will be the office of the present five years from now.

DAVID: What kind of mass storage device will machines have in five years?

BILL: Well, you'll probably still have local floppies in a lot of cases, but most of the storage size-wise will be in shared file servers—and although optical disk may have had an impact, even at present prices and capacities large (magnetic) disks would suffice. There are 300-megabyte disks down in the $10,000 to $15,000 range now. If you can spread it across 20 users—that is, with a good networking scheme—you could justify it. So, while there ought to be some improvement there, I don't think that we've got any bottleneck even today. Networking is probably one of the big chalienges.

DAVID: How are you facing that chatlenge?

BILL: Well, we've designed a structure in MS-DOS that lets it work in a network environment in a very strong fashion—and it's substantially different than what Digital Research has defined for CP-Net. We're passing high level file calls down the network, through a tree-structured directory.

DAVID: What's the most satisfying experience you've had in this business to date?

BILL: I always sort of latch onto the most recent thing. This IBM project was a super-exciting, fun project. We were given, even for a small company, an incredible amount of latitude in changing how things got done as the project progressed. And we really were allowed to feel like some of the key work had been done here. And we had a really great interface with the people from the customer (IBM), even though they're as far away as they could be, down in Boca Raton. The night flight down there is not too much fun. We had a lot of fun together. We had an electronic mail linkup, and we'd send messages every day and we'd give each other a hard time about whichever group was behind on whatever they were responsible for. We loved to kid them about all the security—how we had to have locks, and sign things in, and use code names and stuff like that—but it was just part of the project camaraderie, really. When the thing finally got put together and we did the demo programs, everybody around here was enthused. That's something WE did!

I don't know how many people have read Tracy Kidder's new book *The Soul Of A New Machine,* but it was like that—and everybody really did get their just desserts of being recognized and knowing what part they put into it. People worked incredibly hard. I guess there

was a kind of an anticlimax when I got a form letter from IBM a week after we'd finished the thing which said, "Dear Vendor. You've done a fine job." But they've apologized an appropriate number of times for that.

There'll be more projects. In fact, we're starting up one now which in its general concept should prove to be as exciting. And we're still not at the stage where I'd tell my mother, or some naive person, just to go out and buy one of these machines. In a couple of years we'll achieve that real peak—to fill that gap and feel like it's a real tool.

DAVID: It sounds like from what you're saying that you have probably had more influence on the final result of the machine than anyone, with possible exceptions at IBM.

BILL: Oh, that's absolutely the case. The people at IBM did a fantastic job and there's some super smart people there. I was very, very impressed with the team they put together. They used most of the people who had their own personal computers. Employees within IBM who have the oomph to go out and get their own personal computer and be kidded by their fellow workers, are in general a pretty good class of individuals. And a few of these people were just exceptional.

They were brought in from the company at large and they came down to Boca just for this project. We were the only vendor that understood what the project was about. Even up to the announcement most vendors were kept in the dark about the general scope and the general push of the thing. So we really enjoyed a really unique relationship. I don't think its flattering ourselves to say that I doubt that IBM has ever had such a relationship ever before. In fact, in their internal magazine—*Think*—they even mentioned the role that we played which was quite a thing for them to do. Other than this project, most outside vendors for IBM are really just providing their components and not super involved in how it fits in.

We developed a personal relationship with all those people that's equal to the closest project work we have done.

DAVID: Sounds like it was a lot of fun.

BILL: It was. Everybody around here enjoyed it a great deal. In a way, we always wanted there to be a definitive end to the thing, but even today there's some work going on. It's not like there is just one celebration. Boy, there has been some great...a lot of fun relaxation when we've hit various milestones. I don't know, the announcement was probably the best one because all the way through the project there was this aura that IBM couldn't even say to us that the project would be introduced. They always had to say, "You realize this may get cancelled any day and we'll just call you up and tell you to put all those confidential pieces of paper in a box and mail them back down here and don't call us again." I don't know how long that was really true, but that is really what they had to say to us. To know that the thing would really see the light of day and people would have a chance to evaluate what we had done really made us feel good.

We expect over the next year or two when people have really looked into the machine to see what it can do they will be increasingly impressed. Just like high resolution graphics on the Apple, there is a lot of capability there that will only unfold itself over a fair period of time. Some of that is the stuff we put in there and that will be neat.

I don't read about the TRS-80 any more because it does seem like a long time ago and in comparison it would be pretty easy to make fun of it, but the year or two after we did that project every time we would see somebody disassembling the BASIC or figuring out some little trick we thought it was really exciting.

It's the combination. Software is a great combination between artistry and engineering. When you finally get done and get to appreciate what you have done it is like a part of yourself that you've put together. I think a lot of the people here feel that way.

DAVID: That's quite a statement. Thank you for the interview.

MICROCORP

913 Walnut Street, Philadelphia, PA 19107 215/627-7997

TOOLS FOR THE IBM PC

BASIC ENHANCEMENTS

UNBASIC—a BASIC preprocessor that allows the programmer to write programs in a more powerful extended BASIC. All you have to do is to write your programs using the new features outlined below in addition to standard IBM PC BASIC. Then UNBASIC will translate your program into standard BASIC. Features include:

CASE . . . CEND / Execute one of a number of paths. Like an extended IF . . . THEN . . . ELSE.
Statamant label / Allows reference to lines by an alphanumeric label.
LIB / Retrieves epecitied UNBASIC subroutines from a disk library file and appends them to your program betore translation into Standard BASIC. Automatically renumbers subroutines.
WHILE . . . WEND / Multi-line capability.
Functions / Multi-line functione with neating.
Available NOW $75

ASSEMBLER

8088 ASSEMBLER—includas the tollowing features: Generatee object code for all 107 8088 instructions. Full assembly-time macro capability. Detine byte, Detine word, Detine doubleword, Define storage, etc. Written in UNBASIC for easy modification.
01/82 . . . . . $75

COMMUNICATIONS

INTELLITERM—an easy to use, flexible communications program. Transfar ot any files is accomplished with only a few eingle keystrokes. Split screen display shows your input and the responding computer's reply. 02/82 .$150

DATA BASE

A database can be compared to a file cabinet as it stores records in an orderly fashion and allows easy retrieval of information. A database trees the user or programmer from worrying about how the PC stores data on disk and retrieves it.

T.I.M. III—state of the art data management program. Its many menus and people-oriented approach make it simple for even the novice to uee. Features include printing ot lists and reports and selective record retrieval. Contains up to 8 field types with 32,000 record per file . . . 40 fields per record . . . 60 characters per field . . . 40 sorted orders . . . 20 calculated fields per record. NOW. $500

DATAMASTER—the most flexible data base management system for your IBM PC. Provides true variable length records, user detined input and report formats, reformatting ot praviously entered data records, and more.
Summer '82 ($Full credit for T.I.M.) $800

LANGUAGES & COMPILERS

OMNI—a machine-independent compiler/interpreter generating very compact code. Supports virtual memory. Pre-defined data types include byte, word, string, byte array, word array, string array, bit array, record, and screen. Highly extensible and flexible, with speed comparable to assembly language. Fall '82 . . . . .$500

SUPERBASIC—a superset ot Microsoft Basic. Incremental compliation allows ease of develoopment ot an interpretive BASIC, but runs with the speed of a compiled program. Variable record lengths, user-defined record layouts, and many more teatures are added to the BASIC language. Opt. Run-time pkg.
Fall '82 . . . . . $250

HARDWARE

Daisy Wheel Printer—Tandy DWII $1960
IBM PC 2 drive 64K $3300
All IBM hardware/software products available.

Intelliterm & Datamastar available now for TRS-80.

FREE CATALOG

Containing Utility Software

☐ I have purchased ☐ I plan to purchase
_____ IBM PC's _____ K _____ disks
☐ Mono ☐ Color ☐ Comm.
☐ Printer Type _____

Name _____
Company _____
Address _____
_____
City _____ State ____ Zip _____

SUPERLITERACY

Network Systems, The CIA And The Electronic Grail: A Writer's Quest For Perfectly Flexible Text

Clifford Barney

WITH TWO FAIRLY INEXPENSIVE DEVICES —IBM's Asynchronous Communications Adapter or an equivalent, and a "modem" connecting it to the telephone network—plus a simple program for communications, you can make an IBM Personal Computer reach beyond its desk or tabletop to communicate with the world. Communications Editor Clifford Barney (who also edits Computer Network News) will report regularly on how PC users can exploit this potential for outreach. In his first contribution, Barney shares some of his own experiences in this arena and weighs its significance for the future.

One day in 1967, I called at the Stanford Research insitute to interview a computer scientist named Douglas Engelbart about an advanced form of electronic information system he was reported to be developing. I knew little about such systems but I hoped that the meeting might provide the suhstance of a news story for my employer, *Electronics* magazine.

When i entered his office Engelbart was sitting at one of the first cathode ray tube terminals I had seen. As we talked he began filling the CRT with screens of text, which he would suhject to various editing tricks and then dispatch God knew where, all the while keeping up a running commentary in a vocabulary I didn't quite understand, concerning statements and "plexes" and branches and groups.

i watched for two hours as Engelbart played his machine and explained how it was that he could do these wonderful things. However it was no use; I couldn't follow what he was doing, so I didn't see what made it so wonderful. What made the text look like that? Where did it come from and where did it go? What was a plex, really? So I wasted our afternoon, though I don't think Engelbart minded; he seemed to have a wonderful time showing

off his creation. He called it Online System, abbreviated to NLS.

I now realize that, like Parsifal botching his first chance at the Grail, I had been vouchsafed an early glimpse of electronic text, but had failed to recognize it. To me, at that time, computers processed only data. Engelbart had shown me English; not programs, not calculations, not columns of figures, but words and sentences. And though a writer by trade, I had been too disoriented to understand them.

It was years later that I next encountered electronic text. This time it resided on the disc drives at the Providence [R.I.] *Journal,* where I was doing a turn on the copy desk. The *Journal* had installed an advanced text handling system that integrated incoming copy from wire services and the paper's own bureaus, and directed it to the proper departments in the newspaper: news, sports, features, etc. I used a CRT that could edit rings around the oldfashioned pastepot, scissors and soft lead pencil. And the the text editor not only hyphenated and justified the finished story but even counted my headlines for me, a job I had always had to do myself. Newspaper headlines have to fit in their allotted measure, and generations of copy editors had made sure that they did by counting the letters and spaces. If the head was too long, you had to rewrite it. The type wasn't rubber, the printers used to sneer, it was lead. Now the computer did the counting and the type might as well have been rubber; because if my electronically written headline was only a hair too long, I could shrink the type a little, say from 42 point to "41 point," a type size that strictly speaking did not exist. Then the head would fit and no one would ever notice (though a sampling of middle-aged men, eyesight beginning to falter, may have wondered they were squinting at the paper).

Still digesting this second experience of electronic text, I immediately plunged into the third, several months of messaging and conferencing on Murray Turoff's experimental Electronic Information Exchange System (EIES) network. It was while I was entering EIES's logical gardens that the electronic ephiphany occurred: After 25 years of my pounding typewriter, the typewriter started writing back.

"INITIAL CHOICE?" it said. (This is EIES's method of leading you down the garden path, i.e. choosing from its initial menu.)

I was hooked. The damn thing was finally beginning to share the work. Properly teased, it would cough up endless text without my typing a line. About time, I thought, and proceeded to run it through a few tests. EIES is extensively documented, and I spent a good part of the first few weeks online studying its strange rules for manipulating electronic text. There seemed to be a lot of them, and their purpose wasn't always clear to me. But I did begin to get a sense of what Doug Engelbart had been talking about more than a decade before.

NLS, and the newspaper system, and EIES, had been designed for the manipulation of text, not data. The etymologies offer a clear distinction: data is what is "given," raw information, *August sales* or *altitude in feet;* text is literally a "weaving" of semantic and syntactic patterns. "Text" and "textile" have the same root.

So the interpretation, and even the representation, of text is a multidimensional task. Yet text in electronic form still exhibits all of the plasticity of electronic data in that it may easily be edited, transmitted, merged and searched.

As a writer, particularly one being paid to listen, I might have realized the significance of what Engelbart was telling me. Computerized text systems put communications and information handling on a new level. Once Englebart got NLS airborne, *Electronics* magazine might never be the same.

Not that print was going out of style. NLS has since turned commercial as the office automation system marketed by Tymshare under the name "Augment"; if not exactly flying, it has at least made the transition from an experimental system to a practical tool. Yet *Electronics* continues to flourish, fatter and more authoritative than ever. Electronic text does not replace print, but it does supplant it as the general form of recorded information. Print becomes one of the forms of display.

The medieval monks who transmitted their culture a thousand years ago by copying Biblical texts in the *Book of Kells* would today be making them machine-readable. That way they could be stored online and accessed by the electronic version of a concordance, a data base command language. The service would inevitably be called Scripturenet. You could interrogate it and then salt and pepper your prose with proverbs and learned references, downloaded from the net and merged with your novel, your business report or your letter home.

The Online Marketplace

So far as I know Scripturenet does not yet exist, but dozens of its functional counterparts are competing in what is coming to be known as the "network marketplace," described by Herb Dordick of USC's Annenberg School of Communications as a locus where "products and services can be advertized; buyers and sellers located; ordering, billing and delivery of services can be facilitated; and all manner of transactions can be consummated, including wholesale, retail, brokering and mass distribution."

Targeted as customers in this marketplace are those of us who have access to computer terminals—which includes every IBM Personal Computer equipped with the Asynchronous Communications Adapter, or telephone connection device, and communications software. The network marketplace at first offered raw computer power and then developed online data bases, remotely searchable. But much of what is hawked today as "information services" consists of electronic text that you can access over telephone lines from a computer terminal.

What is so special about this medium? In *Toward Paperless Information Systems,* F. Wilfred Lancaster gave the fullest expression to the importance of *machine-readability* as the key attribute of electronic text. Lancaster, a librarian, helped design the SAFE information system for the Central Intelligence Agency (CIA). The function of SAFE is to give CIA analysts sharable access to remote data bases and files. They can construct private information bases composed partly of their own files and partly of files shared on a network. And the whole system depends on putting information into machine-readable form, permitting easy creation, editing, and transmission of text.

Intelligence Goes Public

On the heels of SAFE comes the private CIA, a multinational "worldwide intelligence service" called the International Reporting and Information System, or IRIS (goddess of the rainbow and Zeus's messenger, according to the indispensable Robert Graves). IRIS has hired the services of a former British prime minister, Edward Heath, as a mascot signifying respectability. The organization will provide commercial information service, not political espionage.

Nevertheless, "IRIS is to be built around a powerful computer, *the operation of which is being modeled on the one used by the CIA in Langley,* according to the *Washington Post* (emphasis added). Lancaster's prototypical analysts, their computer screens trained on all the world's information, or at least as much of it as IRIS can get into machine-readable form.

You and I don't have the same access to resources, and our equipment may be unsophisticated relative to SAFE's, or IRIS's, but we can do essentially the same

thing on a PC. Electronic text plus network connections gives the individual unprecedented communications capability.

Einar Stefferud, a consultant who specializes in office automation, rates textual information systems in terms of the *connectivity* and the *mobility* of the information therein. In personal terms, you can see it in the mix of files that scrolls across your CRT. It's different for everyone: now a program to track cash flow, now production statistics, now a Dow Jones report, now electronic mail from a colleague. There is a single display space for all of the information; you can append the cash flow file to the production report, draw your own conclusions, and send an electronic message to your broker. In this repsect, network services become one more input to your computer, just as your stereo set can accept input from a remote FM station as well as an online record turntable.

The services have yet to mature. A clue to the present state of the art in information services is the price of hooking up to IRIS: $20,000 to $200,000 according to the *Post*. Useful databases and sophisitcated text software tend to be expensive.

Yet the primitive text systems available today do provide capabilities for message-sending and "asynchronous conferencing" (meaning not all parties need be electronically present at one time)—capabilities that were simply not to be had ten years ago. A shared text space makes the network something of a library in which everyone can write the books, and a clubhouse where colleagues can gather.

Messaging and conferencing—in which the text is created by the user, not the seller—are not expensive; but they are so new that business management is only beginning to see how they can be used. In organizing commercial computer conferences, I have found even the most technically advanced computer and integrated circuit manufacturers to be wary of investigating computer-mediated communication via electronic text. They'd rather consider video conferencing, which is a wildly expensive replacement for a face-to-face meeting.

Epilog: NLS Revisited

My typewriter now sits on a closet sheif; there are times when it would be handy, but it's too bulky to keep around. As a writer, I have become addicted to the electronic method of creating, storing and transmitting text. I have experimented on a number of text systems, both online and standalone. I have even had a chance to use NLS itself; I too have been able to summon and dispatch screensful of information and mystify my friends; and I have tracked a "plex" to its electronic lair (too complex to describe here).

NLS proved to be a special taste, like olives, and an expensive one at that. But there are now many other text systems available; every personal computer comes with a word processor. So many people have been exposed to electronic text that it has spawned a new discipline, "Electronic English," which has been taught for credit by Dave Hughes at Colorado Technical College. There are those who claim that the medium actually improves verbal proficiency. Others are skeptical; one dissenter has noted darkly that just as the chief effect of the invention of the typewriter was the proliferation of the busines letter, so hypertext might bury us in well-formatted nonsense.

But this argument puts the new wine in old bottles. The potential of electronic text is not to be exploited in asked it to do what is already done well, or well enough. That is a "horseless carriage" approach that we see in the marketing of computer message systems as "electronic mail." (They are really systems for sharing files, and they perform many functions having nothing to do with mail.)

It may be that in order to be properly recognized, the medium needs a catchy name. "Electronic text" is pedantic, and "machine-readable" too technical. Ted Nelson, the visionary author of *Computer Lib/Dream Machines,* coined the term "hypertext," which has become in-group slang for the kind of multidimensional, nonsequential writing that electronic text produces. Another candidate is "superliteracy," a label that makes people nervous until they find out how many of the super literates can't even spell. "Augment" was Englebart's own choice for the commercial name of NLS. He felt that the medium could augment the ability of an information worker in the same way that a lever augments physical strength.

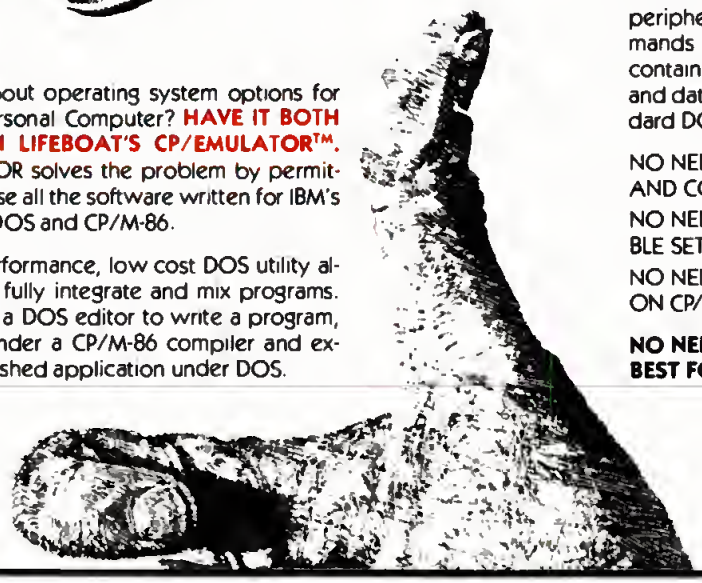
A sentiment like Engelbart's may have inspired the author of the "superliterate manifesto" that has been woven into the EIES hypertext (Conference 52 on Superliterate Societies, EIES). This message (*see box*) is not elitist at all, but a vision of what might be possible from the medium.

The manifesto is not your ordinary account of the potential of computers and computerized text. Yet it does hint that there are more aspects of this new world than we have imagined so far. The next round will be greatly influenced by the thousands of personal computer users who are just beginning to experience the medium, including, presumably, the readers of this text. Your contributions are eagerly awaited.

IBM'S DOS or CP/M-86™?

Confused about operating system options for your IBM Personal Computer? **HAVE IT BOTH WAYS WITH LIFEBOAT'S CP/EMULATOR™.** CP/EMULATOR solves the problem by permitting you to use all the software written for IBM's PC for both DOS and CP/M-86.

This high performance, low cost DOS utility allows you to fully integrate and mix programs. You can use a DOS editor to write a program, compile it under a CP/M-86 compiler and execute the finished application under DOS.



CP/EMULATOR extends the scope and capacity of all of your software. With CP/EMULATOR, CP/M-86 programs run quicker with faster file access than with CP/M-86 itself.

Additionally, your program will enjoy all the other DOS advantages, such as large file size, dated directory displays, and more. The DOS peripherals are already installed and DOS commands are fully available. The package even contains a utility program to transfer programs and data files from a CP/M-86 diskette to a standard DOS diskette.

NO NEED TO LEARN A NEW SET OF UTILITIES AND COMMANDS;

NO NEED TO END UP WITH TWO INCOMPATIBLE SETS OF DISKETTES;

NO NEED TO SPEND HUNDREDS OF DOLLARS ON CP/M-86, WHEN CP/EMULATOR COSTS $75.

NO NEED TO WONDER WHICH OPTION IS BEST FOR YOUR IBM PERSONAL COMPUTER.

PMATE™: Editor-in-Chief

Perform miracles of manipulation on your keyboard with Lifeboat's PMATE.

This new generation text editor is the most sophisticated text editor available today and is bristling with features previously unavailable on microcomputers, making it ideal for virtually any program or data file editing.

PMATE's command set includes full screen single keystroke editing, horizontal scrolling, automatic disk buffering, macro command language, text formatting, expression evaluation, conditional branching, I/O with prompting, and other programming language constructs. PMATE makes use of 11 buffers for storage, and includes commands permitting work on more than one text at a time. Unique to PMATE is the facility for user customization. Keystroke functions can be redefined, and sequences can be programmed to directly execute macros. Video commands can be changed, and macro functions can be written, to emulate any other editor with which you may be familiar. PMATE provides full side-scrolling, and can be used with virtually ANY video terminal on the market. IF you use an editor, you need PMATE.

PMATE is the **only** text editor you'll ever need.

PMATE-86 is available for IBM's Personal Computer DOS, SB-86™ and MS-DOS™. Also available is PMATE for SB-80 and other CP/M-80-compatible operating systems.

Lifeboat Worldwide offers you the world's largest library of software from its offices in the U.S.A., U.K., Switzerland, France, West Germany and Japan.

For more information, send to:

Lifeboat Associates
1651 Third Avenue
New York, New York 10028
Tel: (212) 860-0300
TWX: 710-581-2524 (LBSOFT NYK)
Telex: 640693 (LBSOFT NYK)

LIFEBOAT HAS THE ANSWER

THE FREEDOM NETWORK

New service lets you send messages to Telex, TWX, even "fax" machines from your PC.

VIA A NEW TELECOMMUNICATIONS SERvice, IBM Personal Computer users can now send electronic messages to any of several hundred thousand locations with otherwise-incompatible receiving equipment, according to Dick Sherwin of Graphic Scanning Corporation. Sherwin says the accessible devices include teletypewriters (TWX), Telex and facsimile machines, and specialized office word processors.

The Freedom Network, a service of Graphic Scanning's Graphnet subsidiary, has been in partial operation for several months, and Sherwin said it was scheduled for full operation January 1. The Freedom Network can receive text from any communications-equipped PC, translate or modify the data to suit 110 different variations of hardware, software and communications standards, and then retransmit the message to the designated receiving equipment and location. Cost to the sender will be about 30 cents per 100 words transmitted.

Sherwin says users of the Freedom Network will be able to send electronic messages to about 140,000 TWX and Telex terminals in North America, and to locations equipped with many popular models of "fax" machines such as the Xerox 410 and 3M 600A. They will also be able to send text to offices with communication-equipped word processors from CPT, Lexitron, Wang and others; international Telex will be possible too, Sherwin said.

The Freedom Network translates and retransmits messages to TWX and Telex locations at the time they are sent. Messages to other kinds of equipment are stored in Graphnet's computer for later resending, and can only be stored for destinations already registered with the Freedom Network. Access to The Freedom Network will be available by local telephone call from most large U.S. cities, according to Sherwin. Cost to use the service, over and above transmission time, is $5 a month. There is no initial fee. The 30-cents/100 words rate (Sherwin did not define a "word") applies to most transmissions, and remains constant at all hours. Telex transmission is slightly higher. Users must also bear any cost for their phone calls to The Freedom Network.

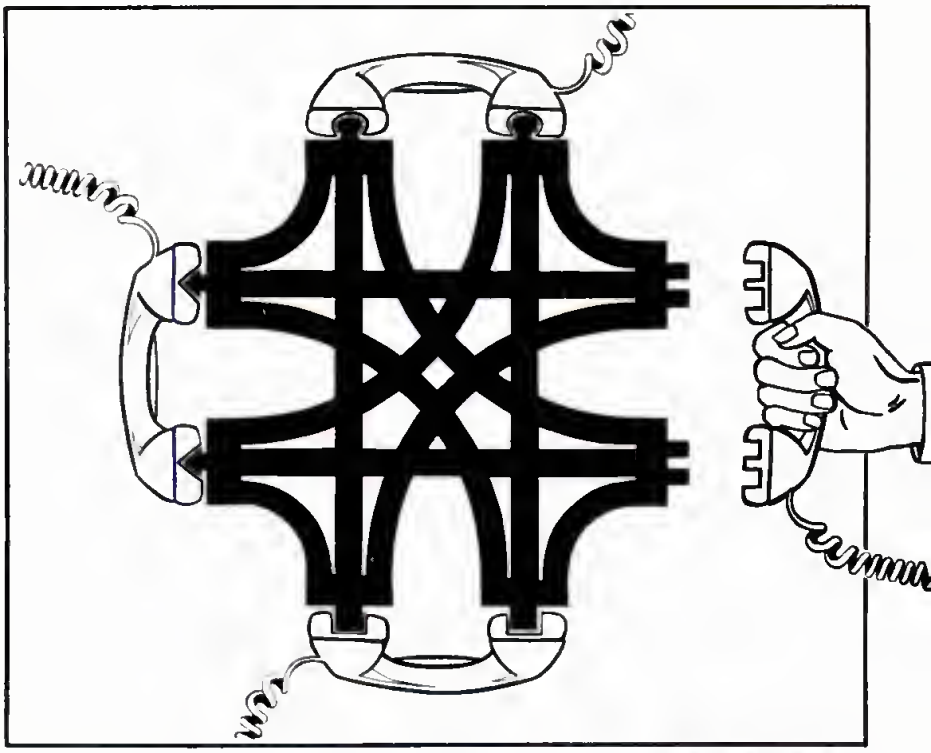


Illustration by Don Nace

Though Graphnet's target customers for the service are "Fortune 1000 companies," Sherwin said the company would not turn away "onesy-twosy" business from individual Personal Computer users. However he said credit references might be requested before an account was established.

Calculations suggest the cost to use The Freedom Network will be very competitive with that of express delivery for moderate quantities of text. A business document of eight to ten average-sized pages could be sent via The Freedom Network for the same price as a letter sent by the Post Office's Express Mail Service. Anything shorter would be less expensive, and in any case delivery would take place in a matter of minutes rather than overnight. (The comparison is inexact because messages sent by The Freedom Network presently cannot include signatures, graphic material, etc.).

If you would like to check out some places you could transmit to via The Freedom Network, you might consider purchasing a directory of Telex and TWX subscribers in North America. This volume, available from Western Union, is set up like a phone directory, with both alphabetical and classified sections. Also, Sherwin says "thousands of subscribers, including many major companies" already have electronic mail addresses assigned on The Freedom Network. A printed directory of subscribers is in the works, and there is a 24-hour "Directory Assistance" service as well.

"We are trying to make electronic communication as easy as possible for people," Sherwin said.

—Jim Edlin

The Freedom Network—Graphic Scanning Corp., 329 Alfred Ave., Teaneck, New Jersey 07666 800/631-1608

Hayes Stack™

Microcomputer Component Systems

At Hayes, we don't believe in second best. Or planned obsolescence. We believe in taking the state of the art to the limit. Our new Smartmodem, for example, is the most sophisticated 300-baud originate/answer modem you can buy. And yet, it is perhaps the easiest-to-use modem ever.

RS-232C Compatible. Smartmodem lets any RS-232C compatible computer or terminal communicate by phone with other computers and time-sharing systems located *anywhere in North America*. You get full and half-duplex operation with both Touch-Tone* *and* pulse dialing.

Auto-Answer/Dial/Repeat. Smartmodem can answer the phone, dial a number, receive and transmit data, and then hang up the phone – automatically! If desired, Smartmodem will even repeat the last command. You can depend on Smartmodem for completely unattended operation.

Completely Programmable. Smartmodem can be controlled using *any* programming language. Over 30 different commands can be written into your programs or entered directly from your keyboard.

Smartmodem also includes several switch-selectable features that let you tailor performance to your exact needs. You can "set it and forget it" for the ultimate in convenience.

Built-In Audio Monitor. Thanks to an internal speaker, you can actually listen to your connection being made. You'll know immediately if the line is busy or if you reached a wrong number – *and you don't even need a phone!*

Status at a Glance. Seven LED's indicate Smartmodem's current operating mode: auto-answer, carrier detect, off hook, receive data, send data, terminal ready and modem ready. You're never left in the dark!

Direct-Connect Design. Smartmodem is FCC registered for direct connection to any modular phone jack – there's no acoustic coupler to cause signal loss and distortion.

Smartmodem, Smart Buy. Professional quality features. Versatile performance. A full two-year limited warranty. A suggested retail price of only $279.

What more could you want? Perhaps the matching Hayes Stack Chronograph, an RS-232C compatible calendar/clock system.

Check out the Smartmodem wherever fine computer products are sold. And don't settle for anything less than Hayes.

Hayes

Smartmodem. The ultimate concept in modems is now a reality.

Hayes Microcomputer Products Inc. ... Corners East, Norcross, Georgia 30092 (404) 449-8791

Hayes Stack is a trademark of Hayes Microcomputer Products Inc. ... in the U.S.A. ™ American Telephone & Telegraph © 1981 Hayes Microcomputer Products Inc.

GAMEWARE COMING, BUT...

Carl Warren

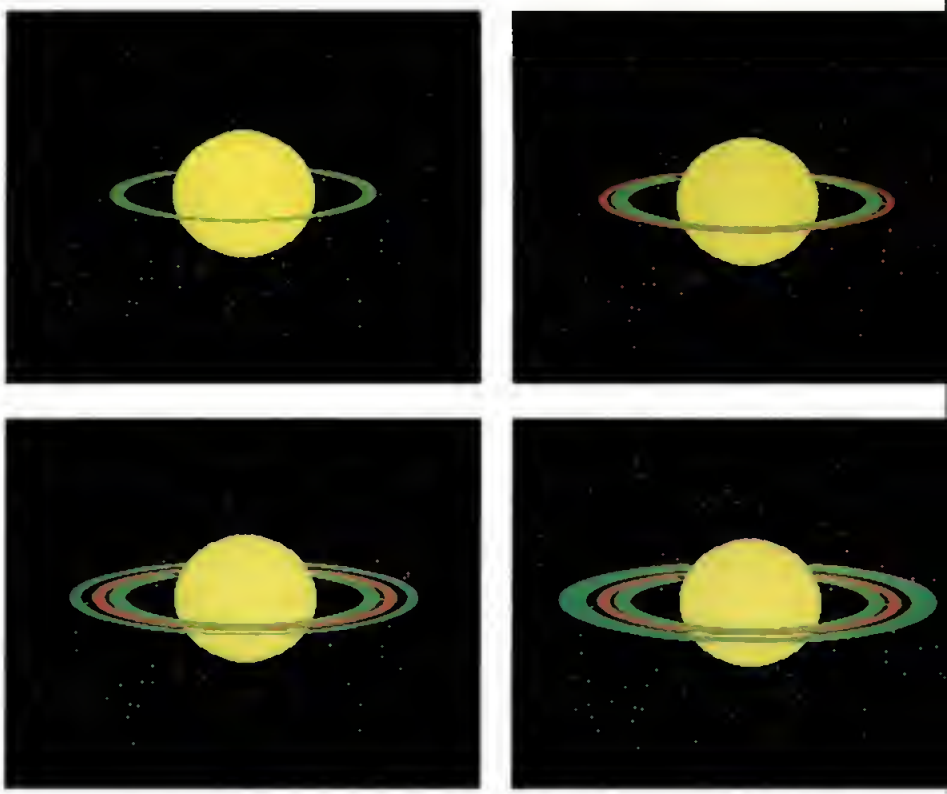
SPOT A PERSONAL MICROCOMPUTER, AND immediately you might think of games—games that fill the screen with strange beings, make buzzing sounds and even talk. Games have always been a mainstay of personal microcomputer systems, and the IBM Personal Computer is ideally suited for the electronic illusions. But even though the PC has technically superior features capable of supporting exciting and unique game-ware, some believe that games—particularly of the arcade type—will be the least desired programs for the machine.

Market analysts, and IBM, don't see the Personal Computer as being just another personal computer to be used to entertain the family on a cold winter's night. This computer, more so than others, is targeted as a productivity machine for the family and manager of today, rather than a sophisticated device to garner points by 'chomping' gumdrops or cookies or whatever a game master can dream up.

Playing the "What-If" Game

But gaming is more than just shooting down alien beings from outer space, asserts Dick Ainsworth, creative director at The Image Producers, a program development company in Northbrook, Illinois. Ainsworth believes that users of the IBM computer will want to play true-to-life sophisticated games, like making projections on the outcome of certain business decisions. "Playing the what-if game is more exciting than any arcade game I can think of," says Ainsworth.

Regardless of how you define a game, the key is excitement. And by employing the unique display and control capabilities of the IBM computer, game designers will be able to create some unique packages for it. Partly supporting this thesis is David Ahl, publisher of *Creative Computing*, Morristown, New Jersey. He contends that buyers of the IBM computer will want games, but will demand more intellectual games like Chess, Othello, or Backgammon. "The machine lends itself very nicely to this type of game," says Ahl.



Graphics resolution, color and animation powers shown in this IBM demonstration should inspire game designers

Learning By Playing

If you use IBM as the gauge, Ahl is correct. Intellectual, tutorial style games are the ideal offering. Currently, IBM is offering a series aimed at teaching through game techniques. Fact Track ($90, diskette) covers basic arithmetic skills and is organized by level of difficulty. In the same genre are Arithmetic Games One and Two. The first set has two games called Beano and Rocket that are designed to refine your math skills while playing an enjoyable game. Set number 2, takes the method further and includes basic logic skills. These last two packages are priced at $60 each on diskette, and were developed by Science Research Associates for IBM.

But number games aren't the only thing IBM is offering. The fourth package in the new series is Typing Tutor ($25) which comes to IBM from Microsoft Consumer Products. This product, created by The Image Producers, uses the concept of automated teaching via game skills, and is designed to teach you how to type or improve your typing speed and accuracy.

The tutorial/game technique may be more the rule than the exception according to some industry watchers. Already managers at local ComputerLand stores

Carl Warren, author of over 600 articles, two books and a number of technical manuals, is a Western Editor for EDN magazine, and contributes regularly on microcomputer topics to several other publications.

are finding that buyers of the new machine are asking for software that can be useful over a long period of time. They report few requests for arcade games. Customers will accept, however, those packages that teach as well as play a game.

Creative Computing's Ahl has taken a different approach with three games: Blister Ball, Torax, and Tsuanami, all of which are in the final development stage for the PC. He points out that these aren't copies of other popuiar games, but are original arcade games that challenge the player and, for that matter, the machine.

Retrofits by March

Ahl and others expect a spate of retrofitted games (adaptations of those designed for other computers) to come availabie for the PC as early as March, with more sophisticated games coming on the scene 9 to 12 months later.

The reason for the time lag? Programmers have to become famiiiar with the machine and develop ways to take advantage of all its capabilities. Moreover, even with the development cycle aside, there is wide speculation that most game designers will offer their product to IBM for first evaluation, with only a small number taking the game directly to market. By offering first to IBM, software publishers will have to live with an evaluation cycle which could last as long as 4 to 9 months, depending on the package. The non-IBM method may reduce the time it takes to get the product to market, but direct-seiling game publishers may find it difficult to locate the right audience.

To assist in the development of all types of software, IBM is providing would-be authors with full technical support—even to providing a specific engineering contact to answer questions about the operation of the machine, and giving detailed information about the PC's technical details.

But even with giant IBM providing a great deal of assistance, potential game authors may run into possible legal trouble in their retrofitting efforts. Should an author market a game similar in display and playing concept to an arcade game owned by Atari, for example, (which also owns the rights to all Bally games) that author can expect problems. Atari has gone to great lengths, including filing video tape representations of the games with the copyright office to protect its rights. What this will ultimately mean is some of the games you now find in coin operated arcades won't be availabie on the Personal Computer. What you can probably expect though is for software companies like Dakin5 Corp., Denver CO, to retrofit their popular Kaves of Karkhan to work on the IBM PC, and other game companies to follow suit as quickly as possible.

A Two-Faced Machine

The IBM personal computer appears to be a dichotomy at this early date, since it offers high-resoiution color graphics, speedy screen updates good for animation, a fiexible game port for handling game controls, plus the power and overall styling to fit business applications. All of which make the machine ideal both for games and business purposes. But Wayne Green, for one, isn't convinced that anyone has reaily figured out what the machine is to be used for. Green, President of the Peterborough, New Hampshire, company that publishes Instant Software, believes it's still too early to make any broad statements about the machine. Moreover, he isn't sure if it is games or business applications that will be important. He does point out, however, that games are usually popular and that eventually Instant Software will offer a variety of packages, with games being included. But what those games might be, Green would not yet guess.

Conceivably, the powerful IBM PC may open up a whoie new era of game-ware. Don't be surprised to see, in the next several months, games that are based on real-life simulations, or that teach complex subjects in the form of a game. According to Loren Werner, owner of a Los Angeles, Caiifornia based technical documentation firm: "I expect that by 1983 we'll be creating highly technical documentation on the IBM computer, and using gaming techniques to develop an understanding of the topics."

NEWS:

From Intermedia Systems

Memory Expansion for the IBM Personal Computer

Cupertino, California

Intermedia Systems announces the 4194 MEMORY EXPANSION MODULE for the IBM Personal Computer. This product provides 192K Bytes of memory on a single card occupying a single Expansion Slot.

Key features include:

1. 192K Bytes on a single card - directly replaces three IBM 64K Byte cards.
2. Low power consumption - less than 350 mA, leaving ample power for other I/O Adapters.
3. Simplicity - installs in five minutes in any available Expansion Slot.
4. Reliability - designed to meet the same stringent standards as our industrial Graphic Display products for Hewlett Packard computers.
5. One year warranty (return to factory).
6. Available NOW!

The IBM Personal Computer has only five expansion slots and a limited amount of power for them. The 4192 Memory Expansion Module expands the user's memory to the current maximum possible and makes minimal demands on space and power.

192K Bytes: $1095 (suggested retail)
Available at all participating ComputerLand stores and other selected dealers.

(408) 996-0900

intermedia systems

10601 S. Saratoga-Sunnyvale Rd. Cupertino, CA 95014

User's Report:

NOT-SO-EASYWRITER

EasyWriter word processing program, version 1.00.

Andrew Fluegelman

EASYWRITER, produced by Information Unlimited Software, program by John Draper and Matthew McIntosh. IBM Personal Computer Word Processing Series.

AFTER ABOUT A MONTH OF UNEXPLAINED delays, IBM's first and, to date, only word processing program for its Personal Computer has finally been released. What will the average writer discover once that pale blue binder has been pulled out of its slipcase?

The first impression is likely to be that the EasyWriter program does in fact live up to its name. The documentation follows the superb format of the other PC manuals, being elegantly printed and clearly written, and making good use of boldface headings and examples printed in contrasting green ink. I was able to sit down and read through the entire body of the manual (84 pages, including a tutorial) in about an hour and come away feeling that I had a fairly good handle on the way the program worked.

EasyWriter is organized on a three-tier system. Upon loading the program and storage diskette, the File System menu appears on the screen, listing sixteen available commands for editing, saving, revising, linking and printing files, plus information about the current file in memory and the capacity of the storage diskette [fig. 1]. The prompt "*COMMAND:*" asks for a one-letter instruction which is the first letter of the corresponding command. It's all clear and straightforward, and even someone who's not familiar with the concept of word processing files should be able to find his or her way without undue anxiety.

The "E" command gets you into the second tier of the program, the Edit mode, which is where all entry and revising of text is done. If no file is in memory, you're presented with a blank screen and a blinking cursor, ready to start writing. If you've already loaded a file into memory, the screen displays the text at the start of the file.

This part of the program makes excellent use of the cursor-movement and special function keys of the PC's keyboard. Individual keys move the cursor in all four directions, scroll the text up or down a "page" (actually, a screen's worth), move to the home position on the screen, to tab stops and to the end of the file, allow insertions and make deletions. Using the CONTROL key in conjunction with these enables advancing the cursor a word at a time, deleting lines of text, and moving to the beginning of the file.

Hitting the F3 special function key inserts a blank line below the cursor. F5 deletes a word (including the space preceding it). F6 "undeletes" previously deleted words, a letter at a time. All of these commands are logical and easy to learn, requiring in most cases a single keystroke that doesn't involve an alphanumeric key. Once again, a first-time user should have a much more comfortable experience starting to write with EasyWriter's simple commands, compared to the many multi-keystroke commands resident on a program like WordStar.

If you hit the key marked F1, you'll see the Help menu [fig. 2], which is displayed above the text being edited and which describes all the special function keys. The F2,-7,-8, and -9 keys control commands for moving blocks of copy and controlling printing (more about those later). The F10 key takes you back to the File System menu, while the F4 key takes you to the third tier of the program, the Additional Commands.

(Before moving on, I must note my first quibble. The Help menu is very easy to call up, but it gives no clue as to how to get rid of it. The manual does note, on page 5-1, that the display can be discontinued by hitting the F1 key again, but someone in need of instant on-screen help isn't likely to want to go paging through a looseleaf binder to figure out how to get un-helped.)

The Additional Commands menu [fig. 3], displayed above the text being edited, lists commands which perform a variety of formatting chores. As with the File System menu, all the commands require single-letter inputs that correspond with the first letter of the command. This time, we are told how to exit (hit the ENTER key).

These three menus cover all the EasyWriter commands, except for a group of "Imbedded Commands," which control print formatting. These are adequately described in the manual, but it would have

continued

EasyWriter "Block Move" Tips

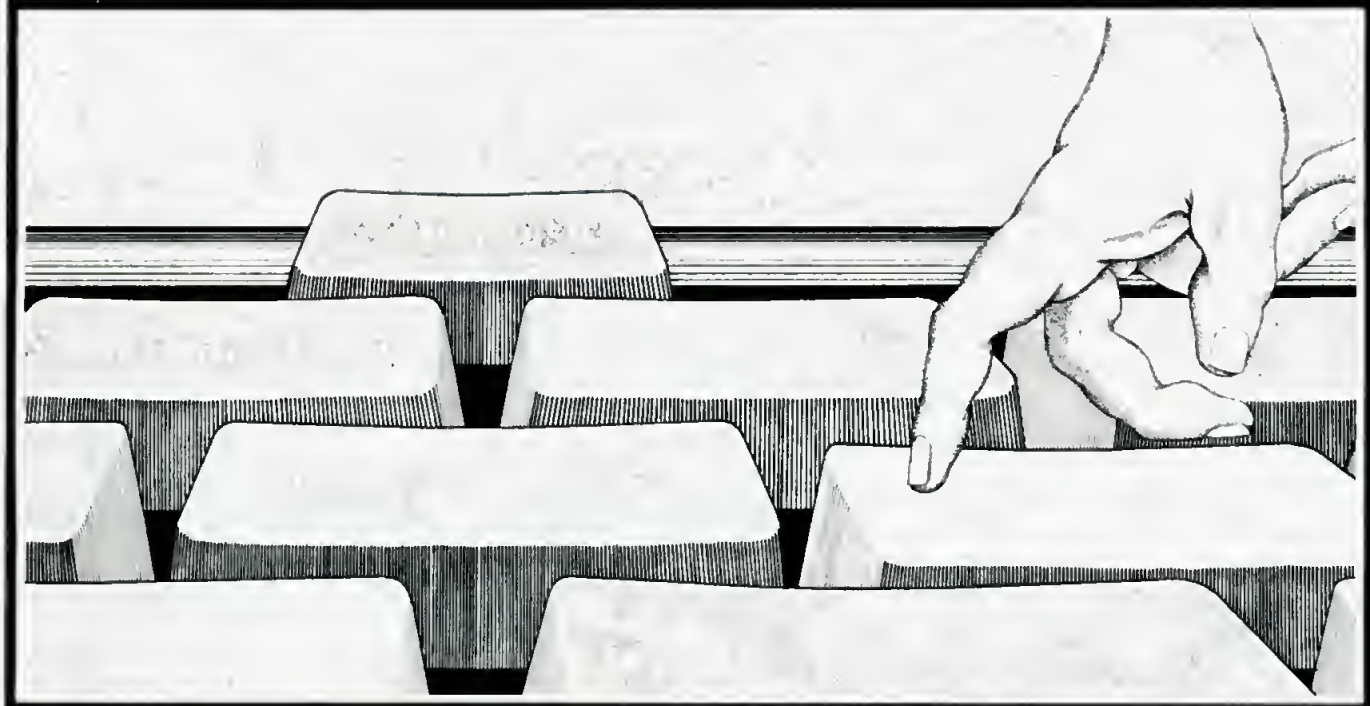
For those of you who are ambitious, I can pass on a few block-moving tips. First, you don't have to insert lines above and below the block, as the manual states. You can isolate a block in the middle of a paragraph simply by entering insert mode and placing the block markers where you want them. You also don't have to go through the double CTRL-J routine at the end of the copy shift. Once will suffice, before the move. (Why the screen gives the ambiguous messages "BLOCK COPY ON" — "BLOCK COPY OFF" is a mystery.)

On the other hand, make sure that you do move the cursor to the line (or the character) in front of the first block marker before hitting CTRL-J and CTRL-C. If you don't, you'll get a "BLOCK TOO LARGE" message, regardless of whether the block is really within the 3,500-character limit. This bogus error message threatened my sanity for a while. Preserve yours by proceeding very carefully.

One final tip: After CTRL-C, and before moving your copy block, delete the trailing block marker and paragraph-end by hitting the DEL key twice (steps 16 and 17 in the 21-step routine above). Then delete the leading marker by doing the same thing (moves 20 and 21) once the copy has been placed in the new location. This will save you undue cursor movement.

–A.F.

THE PROGRAMMER™ HAS THE ANSWERS TO YOUR CUSTOM SOFTWARE QUESTIONS.



Mass produced software has rapidly approached levels of sophistication beyond the imagination of a year ago. However, regardless of the sophistication of this software, every user still encounters the situation where he thinks to himself "If it only did this or had that capability . . ." Now, IBM® has recently brought the power and versatility of their main-frame systems to your fingertips with the new IBM personal microcomputer, and now Advanced Operating Systems complements this accomplishment by introducing THE PROGRAMMER, a software package which brings you abilities previously possessed only by a highly skilled computer programmer.

WHAT DO YOU HAVE TO KNOW?

You must have a clear idea of what you want your program to do. THE PROGRAMMER can't read your mind, but, with your direction, it can actually write the lines of BASIC language necessary for the micro-computer to perform your tasks. *Non-programmers* with little or no knowledge of BASIC-language programming can use the simple, multiple-choice, menu format to create all types of programs.

WHAT DO YOU HAVE TO DO?

You direct THE PROGRAMMER via a series of "menus". Each menu presents a question and a list of the available choices. You simply input the number of the function you want, and THE PROGRAMMER writes the corresponding BASIC program lines. The finished product is automatically stored on the disk, from which it can be copied on another disk for later use.

WHAT CAN THE PROGRAMMER DO FOR YOU?

THE PROGRAMMER can write a _____ (choose the correct response.)

a. data-base program to develop and update a mailing list or keep track of catalog items in your inventory.
b. graphics generator program.
c. program to create sounds or music.
d. customized small business accounting system.
e. program to interface with another computer device.
f. word processing program to print department reports.
g. all of the above, and more.

The correct response to this sample menu is "g". The "bottom line" is that THE PROGRAMMER will write a program for any purpose. The possibilities are limited only by your imagination. Once a program is completed it can be saved on a disk, allowing you to write additional programs. THE PROGRAMMER will not create the ideas, but will permit you to quickly and easily implement any programming ideas you have.

HOW, WHEN, AND WHERE CAN YOU GET IT?

THE PROGRAMMER is not a fanciful dream for the future, but is finished and available to you, right now! The newer micro systems are often limited by an initial lack of readily available software, but with THE PROGRAMMER, you can instantly create your own complete software library.

Now available at your local software retailer, or call (800) 348-8558 to order. (Indiana residents, call (219) 879-4693.) MasterCard and VISA accepted.

THE PROGRAMMER
$495

ADVANCED OPERATING SYSTEMS

450 St. John Road
Michigan City, IN 46360

®IBM is a registered trademark of International Business Machines.

been convenient to include them in a fourth menu that could be called up on the screen. I also wish that the three modes of operation weren't set up on a hierarchical basis. (To get from Additional Commands to the File System, you have to first pass through the Edit mode.) In operation, there are many times when you do want to execute one of the formatting commands immediately following a file instruction —without taking a tour of the whole program.

Those are really just more quibbles, though. Initially, I was truly impressed with EasyWriter as a very friendly program that could be learned quickly by someone without an extensive word processing background. It seemed like an ideal program for a casual correspondent, temporary worker, writing student, or simply for someone not yet convinced that word processing can, indeed, help them write faster and better.

Unfortunately, EasyWriter contains a few very annoying inconveniences and some very serious traps for the innocent computer writer. They start to reveal themselves when you move from understanding the program (which is easy) to actually writing with it, which is, well, not so easy. I've given names to some of these programmed gremlins.

"The Insert Phantom":

When writing or editing text, hitting the Insert key lets you insert text in front of the cursor. This feature operates just about as with other w/p programs, except that it's painfully slow, especially if the screen is filled with a considerable amount of text. The solution, the manual tells us, is to create extra space by using the F3 key to insert blank lines in the text.

All well and good. Hit F3 six times, and all the text below the cursor is dutifully pushed down six lines. Start typing in that blank space and you'll see your new text filling up the first line. Everything looks fine so far, but appearances are deceiving. Reach the end of the first line and you'll see that blank space snap back together, gobbling up a line of your elegant prose in the process.

Woops! The manual does caution you, on page 5-7, that "if you forget to press INS before inserting text, you destroy text to the right of the cursor." But believe me, after weeks of writing with this program, I'm still forgetting and letting my eyes deceive me and gobbling up my words, and I'll wager you will too—and so will your temporary worker and your writing student.

Well, let's say the Insert Phantom is an

continued...

inconvenience. Meet his cousin, "The Enter Demon." The problem with this gremlin is that it's not satisfied with doing just one job. Hitting the ENTER key in text mode puts a little eighth-note symbol on the screen and moves the cursor down to the next line. You use this key to indicate the end of a paragraph, and it works just fine for that chore.

But you also have to use the ENTER key to turn off the insert mode. This is needlessly confusing. (A much more logical arrangement would have been to use the INS key as a toggle switch—hit it once to turn insert on and once again to turn it off.) If you're adding text in the insert mode (which you sometimes have to do, as explained above) and come to the end of a paragraph, you hit ENTER once and it only takes you out of insert mode. You have to hit it again to place your paragraph-end marker. Then you have to remember to hit INS again before continuing—otherwise you'll be gobbled up by the Insert Phantom.

That's not all. You also have to hit ENTER after each of the special formatting commands. If you're inserting these commands in your text, as you're likely to do, you have to go through the same double-strike routine described above. You also then have to deal with the extra line added by ENTER, deleting it with a CONTROL-END. If this is beginning to sound confusing, you're right.

The Enter Demon presents another minor problem. How to insert a paragraph-end in the middle of text? The logical way would be to hit INS, then ENTER. But doing that just turns off the insert mode again. A writer who investigates this conundrum will discover that the ENTER key has insert rules of its own. All you have to do is place the cursor wherever you want the paragraph-end. Hitting ENTER automatically inserts the marker. But will your temporary secretary want to take the time to figure this out before he or she begs to have the Correcting Selectric back?

The Aligning Black Hole

I could go on with more inconveniences, but there are also some very serious problems lurking between the bytes. If you've already got a PC and EasyWriter on hand, load a storage diskette, call up a file of text (make sure it's saved!), and let me introduce you to the "Aligning Black Hole."

Do the following:

1. Hit END, to get to the last text on your file.
2. Hit ENTER. A paragraph-end marker will appear and the cursor will move down to the next line.
3. Hit ENTER once more. A paragraph-end marker will appear on the next line and the cursor will move down again.
4. Now delete that marker by moving the cursor up and hitting the DEL key.
5. Now re-align your text by hitting F4 and typing "A."

Unless your copy of EasyWriter contains a revised version of the program I've got, you're now on your way to the Black Hole. First you'll see the program go through its regular aligning routine. Next, you'll see a little happy-face marker that indicates the end of the file. But the command prompt will indicate that the program is still aligning. And it will continue to be stuck in align mode, with no possible exit, until there's a power blackout, or until you reset the system (and erase current memory!) with the CTRL-ALT-DEL keys.

Preventive medicine:

Check for phantom lines at the end of your file by hitting END and noticing whether the cursor is more than one line below the last line of text in your file. If so, hit CTRL-END several times before aligning. To be safe, always be sure your text is saved before trying to re-align, and pray that your enthusiastic student doesn't stumble upon this black hole on his or her own.

I've also encountered the "Disk Format Charlatan." More than just occasionally, when moving from one File System command to another, I've received an error message that says "DISK NOT INITIALIZED. DO YOU WISH TO FORMAT?"

If this spine-chilling notice appears on your screen, don't panic and type "Y," because, of course, you'll erase everything on your disk while re-formatting. Instead, type "N," and you'll be instructed to "INSERT THE PROPER DISKETTE, THEN PRESS ENTER." Ignore the instruction and simply pull out your working storage diskette and re-load it. Be prepared to get the same error message two or more times before the program reads your disk correctly.

I've experienced this glitch on both my disk drives, which continue to work flawlessly with other PC software. My very strong suspicion is that the problem is inherent in the EasyWriter program. I'd be interested in having this problem confirmed by other users. Meanwhile, warn everyone who's likely to be working with your prized diskettes about this peril.

The last gremlin I'll describe is the "Block Move Blockhead." Plain and simple, the block copy-moving feature of this program is a disaster. It takes a minimum of twenty-one commands and well over a minute to successfully shift a paragraph from one spot to another (place cursor, F3, INS, F8, ENTER, ENTER, move cursor, F3, F8, ENTER, ENTER, move cursor back, CTRL-J, CTRL-J, CTRL-C, DEL, DEL, move cursor, CTRL-G, DEL, DEL). I don't mess with this unless absolutely necessary. (*See box for tips on using the block-move feature more easily.*)

"The Hard Copy Jungle"

When you're ready to print your text, you might find yourself in "The Hard Copy Jungle." This part of the program also contains a number of minor and major inconveniences, plus some real gaffes.

To EasyWriter's credit, the program does present a useful array of what are termed Imbedded Commands. These permit formatting the printout by adjusting all four margins, numbering pages, adding three separate running headings (which can be positioned anywhere on the page), and providing for single or double spacing, variable sheet length, and single-sheet feed. Each of these Imbedded Commands must be inserted as a separate line of text, preceded by a period and terminated by a paragraph-end.

The manual does not warn you, however, that the presence of one of these Imbedded Commands will cause one or more extra line feeds. You can devise ways to compensate and sneak these in at spots where the extra line doesn't cause a problem, but it's really frustrating to have the very commands you use to control your format screw it up in the process.

EasyWriter permits two modes of printing: from the File System Menu, via "H," and from the Edit mode, via F2. Occasionally, these produce slightly different results. Without trying to describe the phenomenon in detail, it seems that printing via "H" doesn't always reset the page numbering and heading features properly. I found printing from the Edit mode with F2 to be more reliable.

EasyWriter comes configured to work with IBM's 80 CPS Matrix Printer, which I haven't tested. If you want to use another printer, such as one which prints letter-quality characters, there's a Reconfigure routine on the Additional Commands menu, which lists various printer options. I tested the "Diablo or Qume type printer" option to reconfigure for a TEC (C. Itoh) Starwriter FP-1500-25, and all of the print features described in the EasyWriter manual (except sub- and superscripts) seemed to work fine.

I didn't have the same luck following the "Spinwriter type printer" option to reconfigure for an NEC Spinwriter 5530. Although the Reconfigure routine gives a

```
                    EASYWRITER FILE SYSTEM

A - APPEND FILE      E - EDIT FILE        H - PRINT FILE       U - UNPROTECT
B - BACKUP           F - FORMAT DISK      P - PROTECT FILE     X - EXIT
C - CLEAR TEXT       G - GET A FILE       R - REVISE A FILE    1 - DRIVE A
D - DELETE FILE      L - LINK FILES       S - SAVE FILE        2 - DRIVE B

FILE #: 4  M/S hdr    FILESIZE= 145     AVAIL= 18415    %USED= 20    DRIVE B
LINKS ARE:   4  1  2  3
  1 Esywrtr1  13350  2 Esywrtr2   3603  3 Esywrtr3   1638  4 M/S hdr      145
  5 FIG hdr      58
COMMAND:
```

Fig. 1—EasyWriter file system display, showing five files stored on the current disk. (Printed by the author's PC system using the PrtSc command key.)

```
                    EASYWRITER HELP MENU

        F1 - HELP MENU          F2 - PRINT              J  - BLOCK COPY
        F3 - INSERT LINE        F4 - ADDN COMMANDS      C  - BLOCK GET
        F5 - DELETE WORD        F6 - UNDELETE           G  - BLOCK PUT
        F7 - STOP PRINT         F8 - BLOCK MARKER       O  - USER KEY
        F9 - ALIGN MARKER       F10- FILING SYSTEM
L                                                                      R
+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
```

Fig. 2—Help menu display. Below menu is format "ruler" showing left and right margin settings.

```
                    A D D I T I O N A L   C O M M A N D S

A - ALIGN TEXT          M - MARGIN SETTINGS     T - TAB SETTINGS
C - CENTER A LINE       P - PAGE SETTINGS       W - WORD COUNT
H - HMI SETTINGS        R - RECONFIGURE         ENTER - EXIT TO EDITOR
J - JUSTIFY ON/OFF      S - SEARCH AND REPLACE
COMMAND?
L                                                                      R
+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
```

Fig. 3—Additional commands display.

bi-directional printing choice, that feature of the Spinwriter wasn't supported. Boldface printing and underlining almost worked, but the line feeds kicked over too soon, or not at all.

There was also a problem printing double-spaced with the Spinwriter. The printer produced single-spaced lines at the bottom of some pages, and always at the end of the file. I did manage to get around this by using the double-space switch on the front panel of the Spinwriter, instructing EasyWriter to print single-spaced, and imbedding ".lines" and ".pagelines" commands that were half the value of what I really wanted.

The EasyWriter program does allow for user-defined printer commands which might be able to remedy such problems. Nevertheless, someone did go through the motions of providing configuration routines. I can only report that if you're a Spinwriter devotee and you prefer writing to studying printer manuals, you're not going to be pleased with what has been provided.

Some program evaluators may be surprised that, for all these cataloged gremlins, I haven't mentioned some of EasyWriter's obvious drawbacks: the indisputable fact that it operates needlessly more slowly than the capabilities of the PC's hardware; its limitation of being able to handle no more than 31 files per disk (maximum 18,500 characters per file); the unavailability of certain formatting sophistications and of merge, sort and spell-check options; the fact that text is stored as specially-encoded data, making it difficult to transfer files to other programs or systems.

I haven't focused on those problems because I don't think EasyWriter was ever conceived as the Rolls-Royce of word-processing programs. Its simple commands and menu structure gave it the potential to be a Beetle—a reliable vehicle that could be driven by anyone, anywhere, without having to call in a mechanic every few miles. That it falls short of that potential is my real disappointment with the program.

The software assembly lines are already humming, and PC users can expect to see compatible versions of the established word processing packages available within the coming months. Many of us with elaborate text-processing requirements will probably snap them up, relieved. But many casual writers would really rather have a truly "easy writer" that adequately serves their needs. Unfortunately, version 1.00 of IBM Personal Computer EasyWriter is not quite that program.

Andrew Fluegelman is the co-author, with Jeremy Joan Hewes, of Writing In The Computer Age, *to be published by Anchor/Doubleday in Fall '82. He is the subject of the* PC Profile *appearing elsewhere in this issue.*

COMING ATTRACTIONS

PC-Lab Reports: What they are; what's in the pipeline.

PUBLICATION DEADLINES FOR THIS Premiere Issue of PC came hard on the heels of the first wave of product introductions for the IBM Personal Computer, and did not permit completion of any product evaluations in the rigorous fashion we hope the "PC-Lab" banner will come to symbolize. In the following article, PC-Lab Director Larry Press introduces the viewpoint and procedures that will guide preparation of articles under that banner, which will start appearing in the next issue.

—The Editors

As you might have guessed from the title, the PC-Lab section of this magazine will publish evaluations of products—both hardware and software—offered for use with the IBM Personal Computer.

The title "PC-Lab" may make you think of a solemn group of researchers in white lab coats, carrying clipboards and conducting experiments; however, this image isn't really accurate. At the present time we have neither a lab facility nor solemn people with white coats. Initially, PC-Lab will rely on a cadre of on-call specialists who will conduct evaluations in their areas of expertise and write up the results for publication. Their work will result in several types of articles

Dr. Larry Press, Director of PC-Lab, heads Small Systems Group, a product evaluation service in Santa Monica, California. He also edits The Personal Computer newsletter of the Association for Computing Machinery.

Comparative Reviews

We will strive to make each of our reviews as objective and repeatable as possible. They will include the results of experiments, tables of capacities, feature checklists, documentation characteristics and general characteristics which are broader than "features." In a comparative review, we will run the same experiments and make the same measurements for each product, and present the results in a common format.

For instance, in a comparative review of file management systems, we would establish several typical data files, and then measure such things as the time required to sort the file or retrieve a record, using each of the programs under review. The amount of disk space used to store the files would also be reported. The capacities of the programs: maximum file and record sizes, number of fields per record, etc., would be tabulated. In considering features and characteristics of a file management program, we would note such things as the number of data types available, the types of indexing which are employed, and the ability to generate reports with various forms of headings and totals.

One possible problem with this sort of experimentally based evaluation is that it might overwhelm relatively non-technical people. On the other hand there is the danger of oversimplifying complex problems and of glossing over important data. This is a difficult tightrope to walk; however, I feel that publications such as *Consumer Reports* have shown that it is possible to inform people about products without talking down to them or boring them to death. If we do our job well, our comparative reviews will teach non-technical readers in addition to helping them in making purchase decisions.

Comprehensive Reviews of Single Products

For several reasons, all of our reviews won't be comparative. For one thing, at this early stage of the game, there are not a lot of similar products to compare. For instance, as of this writing, there is only one word processor available for the IBM Personal Computer. While there will soon be many products to review, the time and effort required to conduct a comprehensive comparative evaluation of several products is substantial. Time is required to plan the evaluation, to conduct experiments and then to interpret and write up the results. Where we think you will value timeliness more than comprehensiveness, we will conduct single-product evaluations.

The danger with a single-product review is that you get one person's subjective opinion. For example, a reviewer who had never used a word processor might love a very poor word processing program, since it was much better than using a typewriter. Furthermore, some people are just more critical than others. One person's "poor" might be another's "good." We will attempt to forestall such problems by selecting reviewers who have experience with products similar to the one under review, and by continuing to emphasize experimentation and objectivity. Instead of saying that a program is "good" or "average", its speed can be measured and its characteristics listed.

Our goal with these in-depth reviews will not be merely to evaluate a single product, but to establish a format which will be used in subsequent reviews of other products of the same type. With time, we will accumulate a group of standard re- ments will be run and the same characteristics and features tabulated even if differ-

Photo by James McCaffrey

ent people conduct the evaluations and they are done at different times. These would also be used if we were to eventually publish a comparative review. Since they will be used in this manner, a good deal of time will be spent on planning, experimentation and designing the report format for these reviews.

Quick Looks, Previews and Reader Surveys

We will also have a place for shorter, less formal articles. These will describe a quick look at a product, based on using it for a few days, without doing much systematic experimentation. Preview evaluations will offer advance looks at items not yet released for sale, and may be limited by the fact of a demonstration being kept under the manufacturer's control. These articles will not be expected to set formats for subsequent reviews, but will be used as a means of letting the readers know about new products relatively quickly. Quick-look articles will have more room for opinion and informal comparison to other products, so we will continue to be careful about qualifying the authors.

In addition to publishing articles and reports such as discussed above, we plan to poll readers on their experience with various products. These surveys would not be able to go into the detail that a review would, but we would gather significant feedback on reader satisfaction with products and vendors. Reader surveys also feel good to me because they provide a way in which we can all become actively involved with the magazine. It is my guess that a magazine which is *used* by an active community of readers, will be both useful and exciting to contribute to.

What's Next?

As you probably know, IBM has already announced several software packages for the Personal Computer. We have just received copies of the Easywriter word processor, VisiCalc, BASIC and the disk operating system and will try to give you at least a "quick look" at these by the next issue of *PC*. IBM has also announced that they will offer UCSD Pascal, the Microsoft Pascal Compiler and CP/M 86, but as of this writing, they have not yet established a firm delivery date for these systems. We also expect a copy of their communication package any day now, and will probably have something to say about that by the next issue. Finally, IBM has published a technical manual describing the Personal Computer. At first glance, it appears to be quite complete and will be must reading for anyone planning to really get into the machine—either as a hobbyist, or as an entrepreneur thinking of developing a hardware or software product for the personal computer. More on that next time too.

Since color monitors and letter-quality printers are not supplied as part of the standard IBM product line, they will probably be featured in early hardware reviews. We have also heard many rumors about hardware and software products which will be forthcoming from vendors other than IBM. At this time, we don't have any firm dates, so we will wait to see what materializes.

It goes without saying that I would like to hear from you. Let me know what products you would like to see evaluated and what you want to see in the evaluations.

IBM's New Personal Computer:

Taking the Me

No single computer event has ever captured more interest from more people than the introduction of the IBM Personal Computer. No single development in personal computers has ever produced more forecasts of far-reaching change.

But all the interest, all the forecasts, were excited by an unknown quantity. At first, the only things actually known were the name, company and reputation behind the coming product. And, for apparent multitudes, that was enough.

Preliminary reports about the machine began circulating immediately after IBM announced it on August 12, 1981. But these were necessarily based on specifications rather than experience. Early October was when the cash customers were scheduled to begin receiving what some already were calling their "PC"s, and some did indeed receive them, but at the beginning only in a trickle. By the COMDEX show at the end of November (see following story) the IBM Personal Computer was still an object of curiosity.

The atmosphere echoed how an earlier generation must have responded when General Motors introduced its first modern sports car, the Corvette, and only a few early models had been let out on the road:

"What'll she do?"

"How fast?"

"How's she hold in the turns?"

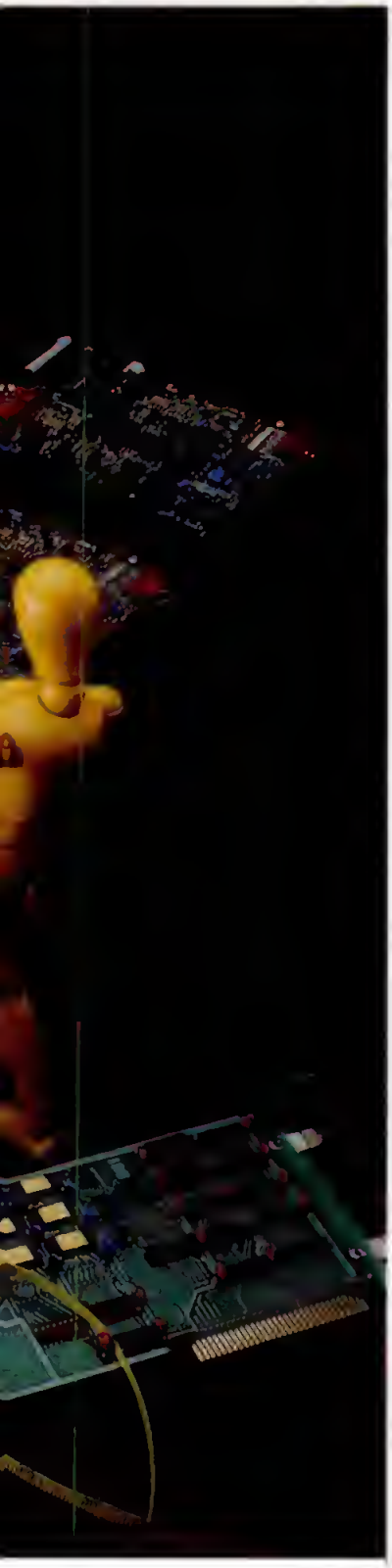
There comes a time when reputation must stand the test of performance, and that is the purpose of the articles that begin here and continue in PC's next issue. We can now begin to take the measure of the machine—to test its reach, its endurance, its power to satisfy.

In this issue we report on the measure of things most immediately accessible: the system software, the potential for expansion, and first impressions in general. First impressions first.

sure
Part One

Jim Edlin and David Bunnell

Photography: Jay Carlson



First Impressions

FIRST IMPRESSIONS START WITH THE box. If someone has given obvious thought to a packing box, you are inclined to suppose they also thought hard about what's inside. IBM has clearly given some thought to its Personal Computer boxes.

To begin with, the packing boxes look good—a tasteful gray-and-white extension of the highly styled machinery within. Secondly, the packing arrangement is exquisitely functional—all tabbed and slotted and nooked and crannied to give the goods maximum protection.

But if you have included the monochrome monitor in your system, the packing boxes also telegraph one other quality about the IBM PC, namely it's an awfully good start but there are lapses. The monitor, unlike the keyboard and system unit, comes in a klunky brown carton bearing random stamps and stickers from its transpacific passage.

Elsewhere in these pages, Microsoft's Bill Gates describes the IBM PC as the personal computer that "stands on the shoulders" of all that has been learned in the last half-dozen years about making personal computers. And so it does, in many respects.

But it is simultaneously the beginner of a new cycle, full of things people will quickly discover can be improved upon.

The keyboard is a good example of both phenomena. Personal computer experience has shown that people like to have two sets of keys for entering numbers—one typewriter-style and one calculator-style. So IBM provides both as standard. Then IBM added a clever arrangement for letting the calculator "pad" double as a set of keys for controling display screen motion. Similarly, in the light of evidence that programmers can make profitable use of special-function keys, IBM provided these too.

The IBM keyboard approaches being a triumph of design, even unto thoughtful touches like adjustable legs for tilt, and a handsome spring cord for connection to the system unit. But that nice spring cord plugs into the most awkwardly placed outlet imaginable, way 'round in back of the computer—rendering half its seemingly-generous length useless. And one wonders how IBM, that ultimate pro of typewriter manufacture, could put the left-hand SHIFT key at the awkward reach they did, let alone omitting the shift-lock arrangement whose use comes so instinctively to the fingers of typewriter users everywhere.

Memory, Memory Everywhere

When one first explores an IBM Personal Computer system, or imagines how one would create programs for it, the dominant impression is one of memory, memory and more memory, everywhere you turn. There is memory for the display, and memory for the other display if you include both monochrome and color in your system. There is memory space reserved for still other displays as yet unspoken-of, or perhaps higher-resolu-

continued

tion graphics to be offered sometime hence. There's memory for plenty of plug-in read-only software. And still there is more memory space left for programs and data than most personal computers store on one, or even two disks.

Other personal computers use their diskettes as simulated "virtual" memory. The PC could use part of its memory as a virtual diskette.

Getting full memory power out of a PC does not come cheap. For what it costs to give one PC its theoretical (as yet still unusable) maximum of memory, you could instead buy two or three more of the most stripped-down PC models. But the prices will continue coming down and it's comforting to know the capacity is easily accessible.

Professionalism But Rough Edges

The lengthy self-diagnosis for problems that every PC performs every time you turn it on is a continuing reminder of the professional standards observed by those who build it. But the self-check causes a pregnant pause after you flip the switch on, and if you are inclined to expect the imminent failure of all complex machinery, the pauses can be repeatedly heart-stopping.

Rough edges keep showing up as you use the computer. When you format a new disk, the formatting program tells you at one point in the process, "strike any key when ready." Yet, because the process could destroy valuable data if it starts prematurely, the user's manual warns you to be careful of striking a key accidentally before you are ready. One would wish for for a better safety measure than this off-hand note. And contrast that situation with the two-hand, two-key contortions—precautions worthy of a factory punch press—needed merely to pause the display listing of a disk directory or BASIC program.

If one is inclined to pick nits, it is probably because they stick out against an otherwise impressively smooth background. But IBM has 120 years or so to correct these. Apparently, that's all the time they have, though; the disk operating system is set up not to accept an entry for "Today's Date?" whose year is any later than 2099.

After which, for all we know, you may end up with an IBM personal pumpkin.

Beanstalk Basic

The PC's BASIC language—powerful and complex.

IN THE HALF-DOZEN YEARS SINCE Microsoft founders Bill Gates and Paul Allen showed up on the Albuquerque doorstep of MITS, Inc., bearing the BASIC language interpreter they had created for that company's pioneering Altair microcomputers, their small seed of a program has grown like Jack's beanstalk. It has shot up and fleshed out to such robust dimensions that a microcomputer-age Jack can truly use it to climb into the land of the computer giants.

THE SEED PLANTED IN ALBUQUERQUE was an 8,000-character (8K) program with limited capabilities that conformed to the spirit of the original BASIC language, which had been invented a decade earlier for use on large computers.

Well that 8K seed planted in the desert sands of Albuquerque has since been nurtured by the rains of the Pacific Northwest (where Microsoft later moved), the hothouse climes of California's Silicon Valley (where Apple Computer, among others, resides), the giant-breeding influences of Texas (Radio Shack), the precise gardening of the Japanese (NEC, among others), and now by the warm sunshine around IBM's Personal Computer factory in Boca Raton, Florida. The resulting growth spurt has left it sextupled in size from its sprout days (to about 48K in the advanced version), with a geometrically proportional increase in power.

The nutrient on which it has grown to such power? Memory, memory and more memory. Thanks to the PC's abundance of memory space, and the ever-falling prices for memory cell hardware, PC BASIC sprawls out over memory acreage hitherto unimaginable for a microcomputer's BASIC language. Two other key nutrients are speed, provided by the 8088 processor's inherent fast operation and an internal instruction set that facilitates high-speed computation, plus experience—the six-year opportunity to discover and supply what people thought was lacking in Microsoft BASIC's earlier incarnations. An additional growth factor for PC BASIC's power was the decision to make it "machine-specific"—that is, to pull many of the hardware design's special features under direct control of BASIC commands instead of requiring their manipulation by POKE and PEEK instructions to obscure memory locations (a common approach for earlier machines).

Where is PC BASIC's new power most noticeable? In the "human interface:" those ways in which a user must go about writing, editing and using programs; in file handling; in error handling; in facilities to create and run interrelated suites of programs; and most of all in graphics, when the advanced version is used.

There are three versions of the Personal Computer's BASIC. The built-in version, supplied with the IBM System Unit in 32K of read-only memory, has most of the new powers except those relating to disk storage, graphics and music. Two supplementary versions of BASIC are supplied with purchase of IBM's disk operating system; one that mainly adds disk-related commands, and an "advanced" version that also adds graphics and music commands. Both versions mate with the 32K of BASIC built into the system unit, the 8K of operating system that is also built in, and the 12K of additional PC DOS operating system loaded in from the same disk as BASIC.

Earlier BASICs often had the on-the-job personality of a meter maid. Park one wrong character in a forbidden zone and it would shout "VIOLATION" and write you up with an error-message citation, showing no mercy whatsoever.

PC BASIC is much more forgiving.

TYPE A LOWER CASE LETTER WHERE A capital is required, and nobody shouts "VIOLATION." BASIC just calmly capitalizes your mistake. Bury a "reserved command word" like ON in a variable name like ONIONS and your Personal Computer goesn't get confused for a moment. What's more, taking the new memory abundance to heart, it lets you give variable names as long as you want, and pays attention to the first 40 characters. To PC BASIC, lucid-to-you names like COUNTY.TOTAL and COUNTRY.TOTAL are mercifully distinguishable.

Editing a PC BASIC program to make corrections and changes is a vastly eased affair compared to earlier BASICs. The

program's designers took into account that their product was going to work on a nice, flexible video screen rather than a clunky old teletypewriter, so instead of old-fashioned "line-editing," PC BASIC gives you *screen editing*. If you are typing away on line 350 of your new program when you suddenly realize there's a change you need to make back on line 300, you just hustle the cursor straight up there, type in your change, and it's done. Then you can zip the cursor back to where you were and go on. The editor design isn't as fully adapted to the benefits of video display as it might be, but it has come a long way from the old days.

One last example of the human interface's thoughtfulness is the way BASIC refers to row and column positions on the video screen. They are numbered starting with 1, which is the way people count things, instead of starting computer-fashion with 0 as in other microcomputer BASICs. (In a curious inconsistency, this nice touch applies only for text display. Graphics rows and columns on the screen are indeed numbered starting with zero.)

Error Handling

"ERROR" IS THE COMPUTERIST'S euphemism for something happening in a way other than planned. Handling errors means planning for the unplanned, and somehow making sure that inconvenience to the program user is minimized.

Errors can range from the inadvertent typing of the lower-case L, when the number 1 is needed, to an attempt to read from a data diskette that has had coffee spilled on it. An unhandled error means the program "crashes." By providing lots of easy ways to detect and correct errors, PC BASIC encourages programmers—you included—to anticipate and forestall possible crashes.

An ON ERROR GOTO... command and its GOSUB brother let you direct the program to a special section when an error occurs. In that special section, other commands let the program figure out what kind of an error took place, *and* even the point in the program where the error occurred. A RESUME command, and a variation of the RETURN command that enables return from a subroutine to a chosen line number, allow extra sophistication in recovering gracefully from errors. For debugging purposes, an ERROR command is provided for temporary insertion in programs under development. When encountered, the ERROR command causes simulation of the error named in it, permitting the testing of a program's error-handling segments.

Program Integration

PC BASIC ENCOURAGES THE CREATION of elaborate, interwoven suites of programs by providing such commands as CHAIN, COMMON and MERGE. The MERGE command, together with powers such as RENUMBER, also makes it easy for programmers to build on their earlier work and the work of others.

MERGE can be used during the creation of a program to weave in earlier-written material such as error handling or file handling routines. It can also be used—together with the DELETE command if desired—to modify a BASIC program at the very time it is running. Such powers are likely to encourage the "menu-driven" technique of program design, where a choice made from a menu would cause merging in of the program section responsive to the choice.

The Personal Computer also provides plenty of facilities for weaving machine language programming into BASIC when its extra speed is desired. Both the CALL and the USR commands are provided for this purpose. Ten different user-written routines are accessible at any given point via the USR statement, and the CALL command can branch to any stated point in memory. Machine-language code need not be within BASIC's 64K of memory space; the DEF SEG command (which defines the start of a 64K segment of memory) makes it possible to access the IBM machine's entire complement of usable memory. You could even stash a machine-code routine in an unused page of the video memory on the color-graphics display adapter. And the BLOAD command makes it easy for a BASIC program to draw machine language routines into memory from disk storage.

Graphics and Music

MENTION OF THE BEST HAS BEEN saved for last in this article. The graphics commands provided in the advanced version of PC BASIC will make it possible for BASIC programs to use dramatic graphic presentations simply and routinely.

A similar command having language-within-a-language properties is PLAY—used to produce music from the PC's built in speaker. Even the built-in BASIC language can utilize the speaker with the SOUND command. But the PLAY command is specifically designed for producing musical sequences using the classical Western scale of notes and familiar tempos. Unlike SOUND, PLAY doesn't require the user to know anything about frequencies and durations, only the traditional notes. Regrettably, there seems no easy way the PLAY command can send its compositions anyplace other than the PC's pipsqueak speaker.

Conclusions

PC USERS AND ENTREPRENEURIAL software authors alike should find plenty to laud in Microsoft's new BASIC for the Personal Computer. Because of its range and power, commercial software authors are probably going to be more inclined than before to work at least partially in BASIC. It is clear a lot of thought went into making the details work sensibly, like rounding numbers off rather than just truncating them when converting from double to single precision arithmetic.

Regarding translation of programs from other versions of BASIC, hints are included in the back of the user manual. But chances are that translation in many cases won't be quite as easy as the manual makes it sound—particularly if the programs use machine-specific features such as cursor positioning or display formatting. And in any case the translated programs won't be able to take advantage of PC BASIC's speed and pizazz without major rewrite.

There is, however, a twinge of sadness brought on by this latest version of a language that no longer fits its name. BASIC is now complex. And for the guy who buys something christened a "personal computer" only to discover that the language for commanding it takes 400 pages to explain, one must feel some sympathy.

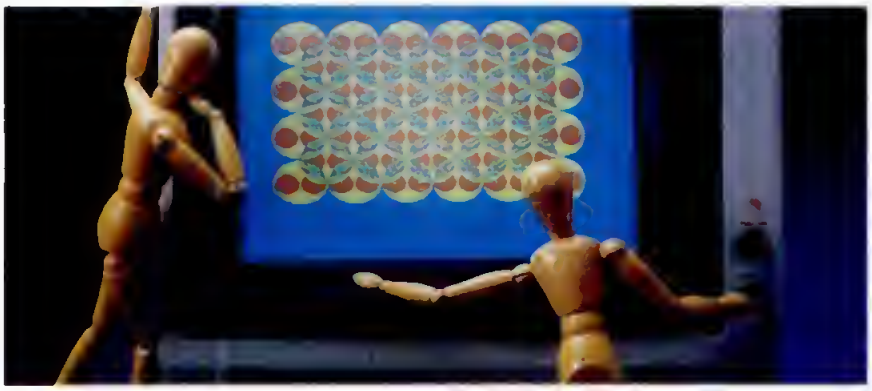
In growing powerful, BASIC has emerged less personal. Many people newly brought into the world of microcomputers by the IBM Personal Computer will find this enhanced BASIC less approachable, more forbidding than its predecessors. Perhaps IBM ought to have borrowed a leaf from Atari and included with its computer not only a comprehensive reference manual to BASIC, but also a friendly, step-by-step introduction for the beginner.

A Language Within a Language

PC BASIC's powerful graphics commands.

TO APPRECIATE THE POWER AND simplicity of one command in PC BASIC's graphics arsenal—the DRAW command—it helps to have seen a child discovering the things he can make a video picture do using the "turtle graphics" instructions of a computer language called LOGO.

By telling an electronic image of a turtle to go this way and that on the screen, even very young children quickly figure out the techniques for developing complex video illustrations. LOGO has a language of simple commands telling the symbolic turtle which way to turn, how far to go in the new direction, and whether to draw a line as it goes. The resulting lines can make shapes, and the resulting shapes can be combined to make still-larger shapes.



DRAW is not so powerful as LOGO nor quite so simply expressed, but it comes from the same school of thought. It is, in effect, a separate graphics language within the larger BASIC language. Each DRAW command is followed by a series of mini-instructions that describe a course of travel for an imaginary penpoint and the actions it should take along the way. The course proceeds from a previously set starting point in any one of eight directions, at 45-degree intervals. The mini-instructions specify distance in each direction and color of line, if any, to be drawn. The instructions for drawing, which are a sequence of letters and numbers, are stored together in a "string" variable.

The dramatic power of DRAW comes from a special mini-instruction ("X string") that allows an instruction string to incorporate others of the same kind stored under different names. Each of these other instruction strings can, in turn, perform the same trick. And so on.

A set of such strings, each bearing the instructions for drawing one simple shape, can thus be conglomerated, layer upon layer, into one long instruction that draws a complex picture. The process can be repeated through many layers of instruction strings. In this fashion a single DRAW command can evoke the appearance of a quite elaborate image.

You might, for example, make one string that draws a little red rectangle, and call it BRICK$. A second string, WALL$ might then make a whole wall by moving the pointer to each new brick location and then instructing: X BRICK$. A DRAW statement for a picture of a house could read: DRAW "X WALL$; X WINDOW$; X DOOR$;..." and so on.

DRAW is not quite LOGO. But—to suggest how close it comes—it seems probable that someone could write a reasonable facsimile of LOGO to run on the IBM Personal Computer using Advanced BASIC and relying heavily on the DRAW command.

Three other commands—CIRCLE, LINE and PAINT—also add graphic power to the PC. CIRCLE is a one-step command that enables the creation of circles, ellipses and segments of them. In the case of segments, the ends can, if desired, be connected by lines to the center. The command is a pie-chart-maker's dream.

LINE should really be called LINE/BOX, since it also draws squares and rectangles, in the same fashion that CIRCLE works. Its drawing of a straight line is really just a special case of a box with one dimension of zero. Finally, PAINT is a command that provides for the filling in with color of any enclosed area on the display. So after you create a circle, box or other figure with the earlier commands, you can use PAINT to fill it in.

Lastly, one other pair of commands contributes to PC BASIC's graphic nimbleness—PUT and GET. These rely on the principle that any picture on the PC's display is simply an array of numbers in its video memory cells. Such an array can be copied to or from any equal-sized array elsewhere in the computer's memory. One could do such copying with a loop of PEEK and POKE statements, but that tactic is rather slow. PUT and GET accomplish the same thing on a machine language level, moving images in and out of screen memory much faster—often fast enough to create video animation.

An example of their use might be after you created the house image discussed earlier with DRAW, PAINT, LINE and CIRCLE commands. The execution of such an elaborate image might take quite a while on the screen. But once it was there you could store it away elsewhere in memory with a GET statement. Then, sometime later you could call it back to the screen in a small fraction of the time the original commands took to draw it in the first place.

With this powerful set of commands, graphics programmers who have never before found it practical to work in BASIC might find they now can do so. This might speed development of exciting graphics-using software for the PC. Also, as noted in the adjacent article, PC BASIC has broad ability to merge existing program segments into new ones. This may inspire commercial program marketers to develop libraries of graphic elements available for incorporation into other programs. Such elements—display type faces, architectural symbols, simple illustrations, etc.—would be the Personal Computer's equivalent of stencils, press-on lettering and the like.

Open System

IBM comes to the plug-in world of personal computers.

TO OLD HANDS AROUND MICROCOMputers, the idea of augmenting your system with plug-in accessories from a teeming bazaar of vendors is a familiar one. But to the growing new contingent IBM is introducing to microcomputers—folks who are as new to personal computers as IBM itself is—the plug-in game may come as a revelation.

SINCE IBM'S NEW PERSONAL COMPUTER is very much a participant in the plug-in game, a brief review of the rules seems in order.

It boils down to this: buying an IBM Personal Computer is more like buying the centerpiece of a component stereo system than it is like buying an Oldsmobile. Many IBM buyers may not be inclined to believe so at first, but we predict they'll come around. Unexpectedly enough, IBM has provided all the ingredients for *bringing* them around. These are:

- the Personal Computer's accessible design,
- IBM's extremely *a la carte* marketing approach,
- and IBM's generous openness with technical information.

Together, these factors explain why the microcomputer industry terms the PC an "open system."

continued . . .

The PC's Plug-In Potential

62-PIN EXPANSION SLOTS

Either the five internal sockets, or added ones in an expansion box. (An expansion box would probably use up one slot in the System Unit for a connector that ties the two together.)

- Memory expansion
- Communications ports (according to various standards—RS232, IEEE4888, etc.)
- Direct-connect telephone model
- Connectors for local networks such as Ethernet and Desnet
- Mass storage device controllers (such as for hard disks)
- Music synthesizers
- External device controllers (such as for appliances and lights)

INTERNAL CHIP SOCKETS

- Enhancements to system software in read-only memory
- Alternate character sets for video display
- Game and other programs, or parts of programs, in read-only memory form

KEYBOARD CONNECTOR

The PC's keyboard connector offers interesting possibilities. The PC keyboard itself is an "intelligent" device, and the channel between it and the System Unit is a serial channel that carries information on keys pressed rather than specific character codes.

Each of the 83 keys has its own number (including separate numbers for each of the two shift keys) and sends one code when pressed and a different code when released. Software in the System Unit keeps track of which keys were pressed and released in which order ("*. . . was the SHIFT key released before the G key was pressed? Hmmm, you must want a lower-case g. . .*") to handle such matters as shifts and Typamatic repeating. The internal software that handles this is accessible for change; also, 45 of the possible on/off number pairs are left unused by IBM. So there is great potential for outside vendors to connect devices through this channel.

- Add-on keyboards with special function keys
- Musical keyboards
- Graphics tablets and other similar devices

CASSETTE CONNECTOR

- Telephone modems
- Device control (via the "motor on/motor off" feature)
- Speech synthesizers

PRINTER AND COMMUNICATIONS ADAPTERS

- Printers
- Plotters
- Telephone modems
- Scientific or medical instruments

GAME CONTROL ADAPTER

- Joysticks and paddles
- Graphics tablets (digitizer pads)
- Robots

INTERNAL SPEAKER PLUG

- Hi-fi sound amplifiers
- Other devices responsive to analog waveforms

The above list is far from exhaustive. Already, in labs, garages and spare bedrooms from Silicon Valley to Sault Sainte Marie, electronics wizards are huddled over logic analyzers, wire wrap boards and other tools of their trade figuring out how to plug in new goodies to the IBM Personal Computer. As their creations appear, they will be reported and evaluated in future issues of *PC*. (Some have appeared already and are discussed elsewhere in this issue.)

At last, a
powerful enough t
of Supe
by Sor

ersonal computer
use the full power

rCalc™

im.

Thanks, IBM.

For more information about Sorcim's bestseller, the SuperCalc™ program, call Steve Warren or Ginger Jernigan at (408) 727-7634, or write Supercalc on the back of your business card and send it to: Ms. Emi Rock, Sorcim Corporation, 405 Aldo Avenue, Santa Clara, CA 95050

SORCIM

Taking the Measure

Inside the System Unit of the IBM Personal Computer, five long, identical, slot-shaped sockets provide places for connecting to all of the PC's important circuits—59 in all. (This design approach is sometimes called a "bus".) IBM accessories, some necessary like a display adapter and some optional like the game paddle adapter, can plug into these sockets. But so can accessories manufactured by anyone else who figures out the proper interactions with all 59 circuits. (There are actually 62 connections in the socket, but some are duplicates.) To help make this possible, IBM has—in a major reversal of its usual policies—published full disclosure about the goings-on and expectations for each of the circuits.

The PC also has a good supply of other available orifices for plug-in products. There is the cassette-recorder connector, and the matching one next to it for the keyboard. There are sockets on the back panels of most IBM accessory cards. And there are the component sockets on the main circuit board itself, some already occupied and some not. For various other personal computers, all of these connector types have been used to attach one or another add-on devices, and it is reasonable to suppose this will happen with the PC too.

What might be plugged into this multiplicity of sockets, and why? Both the products and the answers range from the mundane to the exotic.

The mundane products and answers tend to go together. For example, companies sell expansion cards for read-write memory, and people often choose to buy such cards because they are priced lower than the manufacturer's equivalent. Other reasons might also apply, such as extra certification and reliability or, particularly in the PC's case, an outside company's design that offers more capacity than IBM sells on a single card.

Exotic products include such things as music synthesizers and graphics tablets. Products in the exotic group are usually sold by outside companies because demand for them is not broad enough to interest the microcomputer manufacturers themselves. But from those who have a special interest, demand can be quite fervent.

A computer music enthusiast might want to plug six complete synthesizer cards into his system in order to supply many different "voices" which are playable simultaneously. In the PC's case, this music enthusiast would first have to invest in a different kind of plug-in device—an *expansion adapter* that provides more slots than the five built into the IBM system unit. One such expansion unit has already been put on the market, by Tecmar; but our hypothetical music lover needn't buy one just yet, because as of this writing no synthesizer accessory has yet been introduced. (Judging from the number available for the Apple computer, it won't be long 'til some appear for the PC.)

Sometimes what is first thought to be exotic later turns out to be popular enough for the big manufacturers to begin offering it. This was Apple Computer's experience with graphics tablets, which are rectangular writing surfaces equipped to detect and report the action of a pen moved across its surface. They are useful in computer-aided design, among other applications. For the PC, a tablet might be designed to plug into the game adapter, the cassette port, or even (with a "Y-connector") to the keyboard plug. In any of these cases, software would also have to be added telling the PC how to interpret and act on the signals sent from the tablet via the plug. In fact, it is appropriate to view the slots of the disk drives as yet another place where "plug-in" products for the PC can be installed. Operating system software that can replace the PC's own DOS, such as CP/M-86 and the UCSD p-System, would be examples of this phenomenon.

Operational Choice

Hal Glatzer

DOS, CP/M-86, p-System: Three operating systems for the PC.

I. About Operating Systems

IN THE MOVIES, WHEN THE KING SAYS, "I want my breakfast," a seemingly endless chain of people relays the order. Like a bucket brigade, the words pass from nobles to guards to servants. . . "the king's breakfast!". . . "the king's breakfast!". . . and so on, until the steward tells the cook to fry an egg.

That's how your computer's operating system works. You are the ruler of a microelectronic domain. When you want something, you type in a command to do it, and the operating system actually does the work for you. Programs are only intermediaries between you and your operating system—like the servants in the

king's retinue. If you are working with VisiCalc, for excample, it is the operating system which prepares the "spread sheet" for you to write on, interprets your keystrokes ("that's a 1, a 9, an 8 and a 2") and displays them ("1982") on the screen wherever it has placed the cursor for you. When you are through, the operating system checks to make sure there is enough room in your disk to store the file, and then it transfers the file from the working memory (RAM) to the disk. Finally, it comes back with the "A-prompt" ("A") to tell you that it's ready to serve you again.

A typical program, like VisiCalc, doesn't do those things by itself; it uses the operating system, since those kinds of tasks are common to almost every program and need not be re-invented by each programmer. There is a technical advantage, too, because the program itself can be shorter, saving extra space on the disk for your files.

II. About The Choices

IBM PERSONAL COMPUTER USERS WILL have a choice of three operating systems: DOS, which is the IBM PC's "standard" operating system, CP/M-86, and the p-System, both of which are alternate choices. DOS is priced at only $40, reflecting its position as the "standard." The p-System will cost $675 (with one language included), and CP/M is anticipated to be around $300-350. Because CP/M was the first operating system in the microcomputer industry to be adopted by many different manufacturers, instead of just one, we will consider it first.

III. About CP/M

CP/M WAS DEVELOPED IN THE MiD-1970's when floppy disks were being perfected. Surprisingly, the industry giants did not foresee the advantages of floppy disk storage for the then-new microcomputers; nor did they want to sell a microcomputer operating system that could work with floppy disks. So the man who deveioped the "Controi Program for Microprocessor," Gary Kildall, bought the rights to his invention from his employer and went into business for himseif, as Digital Research, Inc.

By 1981, CP/M was—*de facto*— the standard microcomputer operating system. There are important exceptions but, by and large, every professional microcomputer uses either CP/M as its factory-standard operating system, or is able to use it with only slight modification.

CP/M was written for microcomputers that use eight-bit processors (that is, they work with eight bits of information at any given moment). When a 16-bit processor became available, CP/M was modified to accommodate it. iBM selected the intel 8088 chip for its Personal Computer, and Digital Research asked Johnson-Laird, Inc. to customize its 16-bit CP/M-86 (created for the 8088's "brother" chip, the 8086) to work on the PC.

IV. About CP/M-86

"THE OPERATING SYSTEM IS TO A computer what gasoline is to an automobile," says Andy Johnson-Laird, his company's president. "It's only a means to an end. The novice user should not give a damn what kind of chip is inside his computer. Rather, he's asking, What can I do with it? I say, forget about the chip *and* the operating system. The only time you have to worry about the operating system is when things go wrong."

Among the technical improvements Johnson-Laird buiit in to the IBM version of CP/M-86 were a "status iine" at the bottom of the screen that carries messages to the user, such as clock time, or the progress of internal tasks. His enhancements permit the user to alter the way the computer normally works with its peripheral equipment, such as disk drives and printers.

"You can, for example, support both a letter-quality, daisywheel printer *and* a high-speed dot-matrix printer at the same time, with the same files," he says. "Using our ASIGN utility, within a BASiC program, you can select which device will be used for output, and then redirect that

continued. .

output at any time. You can tell your computer to regard certain physical devices as logical devices. For example, you can send part of a file, like your remarks that aren't part of the working program, to one printer, while the other can be printing your file out.

"We also put in a fairly extensive system for recognizing escape-sequences," he says, "those special functions that are heralded by the ESCAPE character and one or more subsequent characters—for example, the combination that produces a clear screen. If you want to read the current date and time in a program, you can send an escape-sequence in BASIC, so you don't need PEEK or POKE commands. Both of these concepts, the logical device and the escape-sequence, are rather technical, but they're important to technical users."

V. About PC DOS

THE NEWEST OF THE THREE OPERATing systems is called simply DOS (disk-operating system), and was written by Tim Paterson. It was customized for the IBM Personal Computer by Microsoft, Inc., a company that has led the microcomputer software vanguard since 1975. Its founders were two whiz kids who never finished college; they wrote a BASIC language that ran on the first 8-bit hobby microcomputer, and later wrote BASIC and other languages that are compatible with practically every microcomputer ever built.

Microsoft's product marketing manager for DOS, Chris Larson, describes the difference between DOS and CP/M-86 this way: "CP/M was designed around 8-bit hardware, when technology was less advanced. DOS was designed around concepts of a 16-bit operating system called UNIX, that was developed by Bell Laboratories. Microsofts's languages, such as BASIC, FORTRAN, or PASCAL, will only run on the IBM Personal Computer if DOS is the operating system. There's no way a user can get a Microsoft product onto his machine if he's running CP/M-86."

The differences are technical, but important, according to Larson. "Under DOS, you can use the *full* 256K bytes of available memory for a program—not merely the 64K codespace. That means you can run large programs, such as database management. Eventually, the programs that run on 16-bit minicomputers will be brought down to the IBM Personal Computer, running DOS. With CP/M-86, there is a limit to the size of a file: eight megabytes (eight million characters). With DOS, the file size can be up to one gigabyte—one billion bytes! For users who get hard disks that hold 8M bytes or more, that will be an advantage. "Another technical advantage," Larson says, "is that any command that makes use of a disk file can use a device—that is, to the operating system, all devices look like files. In itself, that's not great, but it has wide implications. If you want to add a new device, under a BASIC program, you don't have to change the BASIC interpreter—only the BIOS, the BASIC input/output system."

On the novice user's level, both DOS and CP/M-86 have advanced error-recovery procedures. Instead of "crashing" or giving you cryptic messages, they give you the choice of ignoring, aborting or re-trying an operation, and a clear, unambiguous message appears in the status line.

VI. About Translatability

MICROSOFT'S LARSON IS CONCERNED about what he calls a "myth" concerning CP/M-86. "There is confusion in peoples' minds," he says, "about the possibility of translating 8-bit CP/M software into 16-bit CP/M-86 software. I've heard retailers—who should know better—say you can take a CP/M disk and put it into a CP/M-86 system. You can't! The software has to be translated at the source-code level (i.e. before it has been through the final conversion stage to fundamental computer instructions). A hobbyist *might* be able to do it, but a typical end-user won't."

The source-code must be exact. If the software does not connect with specific counterparts in the operating system, a program cannot run as it was designed to do. Programs which were written to run on 8-bit computers will not work on 16-bit computers, even if the computers and the operating systems are—to the user's eye—superficially alike. A narrow-gauge railway locomotive will not run on a wide, modern track unless the undercarriage is rebuilt.

"We believe vendors and programmers will translate their best programs into 16-bit source code," says Larson, "and it's just as easy to translate a program written for CP/M into DOS as it is to translate it into CP/M-86. So you will be able to get CP/M software without having to get CP/M-86. I believe that vendors and programmers will translate their most popular programs into both CP/M-86 *and* DOS, and then see which becomes dominant in the marketplace. It's easy to support both, technically, but it's a pain in the accounting department to coordinate orders for software on two different operating systems."

Andy Johnson-Laird admits that CP/M-86 has what he calls a "legacy" of 8-bit software to live up to. "Why does CP/M-86 do that? To provide continuity—so the user will not notice the difference. Certainly, Microsoft's DOS runs programs more rapidly than CP/M-86 can, because it's freed from that constraint, and it can adapt more comfortably to the new hardware environment. The file structure of CP/M-86 is paying its dues to the past."

VII. About Portability

THE CREATORS OF ANY OPERATING system are limited by the design of the chip that does the actual "computing" (i.e., the microprocessor). Because no two "families" of chips manipulate data in exactly the same way, an operating system written for one family probably can not be used with any other. For the IBM Personal Computer, the DOS and CP/M-86 operating systems have been carefully tailored, like a custom-fitted suit, to the family of Intel 8086/8088 chips.

But a new idea arose in the late 1970's at the University of California at San Diego: an idea for an operating system freed from the constraints of a chip's family, and so able to work on virtually *any* computer. It was written in a programming language called PASCAL (named for the 17th century French mathematician and mystic), and based on the computer concept called an "emulator," which works like the plastic spindle that lets you play 45 rpm records on a regular phonograph. Programs written in the p-System are translated into a made-up language for an idealized, altogether imaginary processor chip. Then a fast translating program converts this language for the idealized chip (called "p-code") into a real chip's actual language. The translating program is like a human translator who can simultaneously

translate from one language to another, and is called an emulator.

VIII. About the p-System

SOFTECH MICROSYSTEMS, OF SAN Diego, developed this concept into a "machine-Independent" operating system, which it calls the p-System. An emulator fetches each p-code instruction, in sequence, and looks it up in a table; for each p-code there will be corresponding instructions appropriate to that particular chip.

According to Al Irvine, vice president for engineering at Softech Microsystems, the user's advantage comes in being able to take any p-code software, written for *any* microcomputer, and run it on any other. Differences in hardware, he said, presently force users to acquire different software for each machine. "It's as if every time you wanted to buy a phonograph record, you could only use records that were compatible with your particular brand of phonograph. Worse—if you wanted to buy a new phonograph, you would have to throw away all the records you'd bought for the old one. Right now, that situation exists with the three major systems of videotape cassettes and two major systems of videodisks. The last thing we want is for the same situation to be perpetuated in the field of computer software."

The p-System has emulators for 20 different microprocessor chips, including the 8086/8088, he said. "A software author can write a program just *once*, and sell it everywhere. The user doesn't care what kind of system the writer used to develop it, all he wants to do is run it. In the same way, the writer shouldn't have to care what kind of system the user is going to run the program on. If all the box needs is a p-code emulator, and that matches the chip inside the box, then the writer can connect the BIOS to it and make the program run."

For the programmer, the whole p-System takes up 55K of p-code on a disk—a block of code roughly equivalent to 150K of machine code for an 8080 chip. But in any finished program, there is only a 3K "kernel" residing in memory at all times; it loads other parts of the p-code as they are needed. "The 'code pool' is dynamic," Irvine said, "and varies with the programs' requirements. If you open a file, for example, the operating system calls up the segments of code that are used for manipulating files. The applications programmer doesn't have to be concerned with how much memory the executing machine has; it runs as a 'virtual memory.' That is, to the programmer or user, the memory size seems very large, but the machine is actually retrieving and filing pieces of memory from the disk all the time."

Right now, the p-System is mainly a programmer's tool, but it will come into its own as an operating system, Irvine said, when users can "pick up other people's software" and run them on their own machine. For that to happen, though, more application programs such as general ledger, spread-sheet simulation, word processing and games will have to be written in p-code itself. Software development systems are currently available which perform the p-code translations from standard programming languages: PASCAL, FORTRAN, and Softech Microsystems' own BASIC; a COBOL will be released later in 1982.

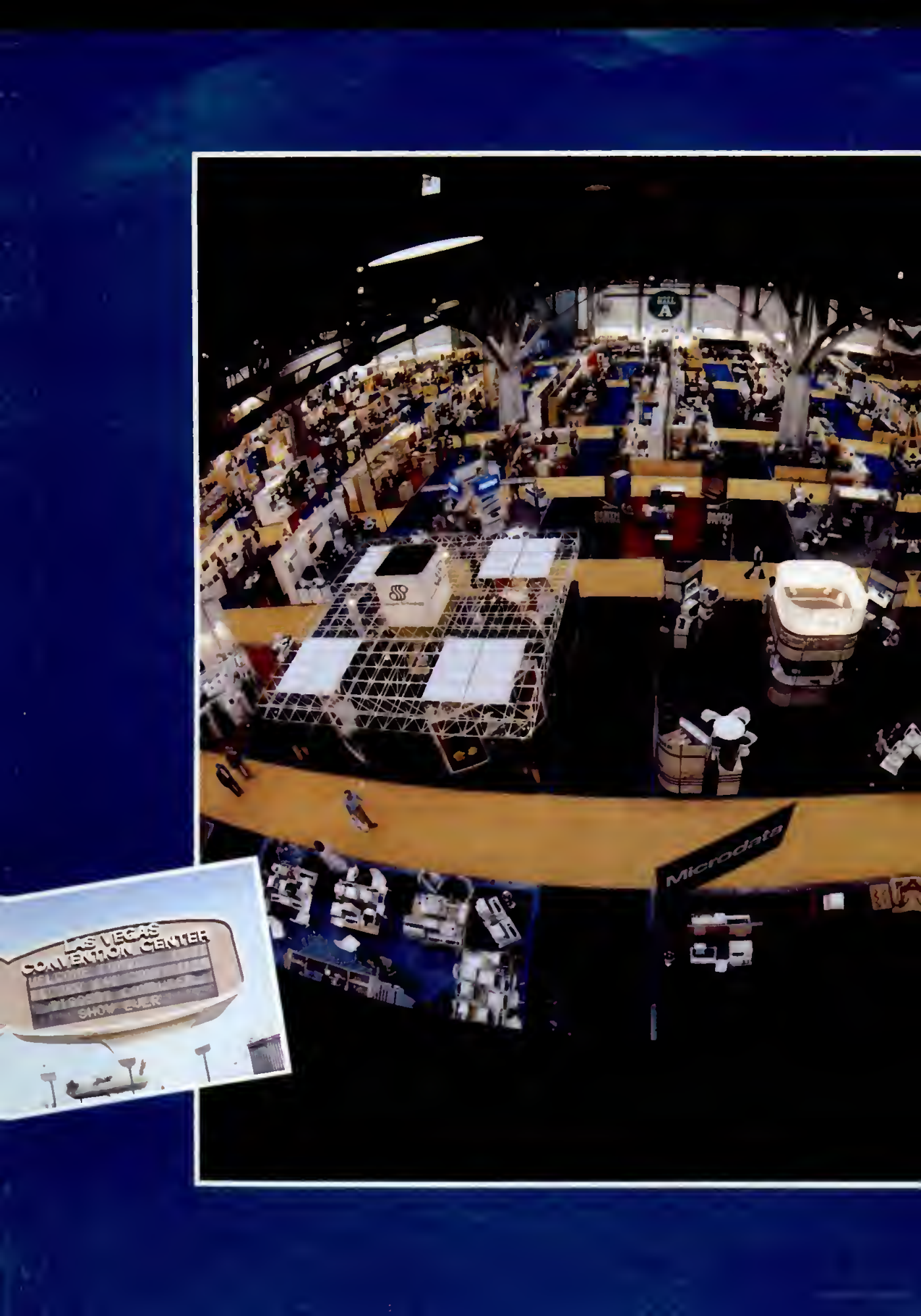
"The exciting moment will come," he added, "when the *end users* discover that the p-system applications programs will outlive their hardware! Their programs will continue to run even on replacement machines."

IX. About The End

EACH USER WILL HAVE TO MAKE HIS or her own choice of an operating system, but Andy Johnson-Laird is philosophical about the selection process. "Which is better? That's like asking which is better—a Ford or an Oldsmobile? They are in overlapping domains. Whichever *you* prefer depends on a lot of things that have nothing to do with their speed or acceleration: things like repair service, or the recommendation of a friend who owns one.

"Choosing an operating system," he says, " is very subjective. Non-technical users won't notice if a program will run a few seconds faster as a result of its operating system. As long as a general ledger program, for example, runs in a 'timely' fashion, they won't care; to them, it's downright miraculous that they can run a computer at all!"

Hal Glatzer is a journalist and television producer who describes himself as an "explainer." His latest book is Introduction To Word Processing, *published by Sybex*


LAS VEGAS
CONVENTION CENTER
Microdata

Comdex:

The Year 1 PC

Photo: The Interface Group

THREE YEARS AGO, THERE WAS NO SUCH THING AS A COMDEX. Two years ago, this national trade exposition for computer dealers was held for the first time. About 180 companies set up exhibits in the Ballroom of the Las Vegas Hilton Hotel, and maybe 4,500 people came to see their wares.

Last year the show expanded into the Las Vegas Convention Center's two smaller halls—a space double that of the Hilton ballroom—to accommodate a doubled number of both exhibitors and aisle-walkers.

And this year (November '81) COMDEX moved into the Convention Center's big East Hall, which dwarfs the other two halls combined. Six hundred forty-four exhibitors mounted displays of their microcomputer wares, and nearly 25,000 people reportedly attended. It was a fitting sign for the year when IBM finally decided to enter the world of the personal computer.

IBM was at COMDEX, with an exhibit booth near the entrance—a glossy thing in chrome and smoked Lucite. But in a curious twist the Personal Computer was not to be seen within. Instead, IBM was showing samples of its more traditional data processing hardware, and the blue-suited minions attending the booth admitted to little knowledge of the Personal Computer. IBM's booth seemed one of the few places in the hall where their Personal Computer was not a subject of major interest.

(Speculation was that IBM chose not to show the PC because COMDEX is a show for dealers, and IBM already had all the interest it wanted from computer dealers.)

Elsewhere on the floor, there was evidence aplenty of the interest IBM's PC had galvanized within the microcomputer business. Clearly, people had wasted no time in rising to the opportunity they sensed IBM was creating.

This magazine was no exception. Six weeks after opening our doors for business, *PC* was there exhibiting at COMDEX, handing out copies of our eight-page "Preview Issue." Meanwhile, our editors and photographer were prowling the floor for products inspired by the PC. To our glee, we found plenty, with promises of greater plenty to come.

20 Add-ons in Two Months

The pleasant shocker for us was right down at the end of our aisle, in the booth of a Cleveland outfit called Tecmar. In about the same time it took us to produce our eight pages, Tecmar had produced a complete line of 20 add-on accessories for the PC. They even had an expansion adapter that could pass for the PC System Unit's twin—until you peeked inside and saw a 5-million character Winchester storage disk where the PC has its diskette drives.

Actual IBM Personal Computers on the exhibit floor were relatively scarce, perhaps because people were still having difficulty getting their hands on them. (Folks kept coming by to look at the PC in our booth and asking if we knew where they could get one quick). Those who didn't have one were talking about them anyway.

The IBM PCs we did see on the floor staked out the whole range of microcomputer goods and services. In addition to Tecmar, there was a printing company, a color monitor company, a local-network developer, a few marketers of business and financial software, and no doubt others we missed amid all the COMDEX hurly-burly. One scout we talked to claimed to have seen twenty-five PCs around the hall.

An Automatic Program Writer

Some products we didn't have to find because they found us. Skip Tamargo, president of a Florida company called FutureSoft, commandeered the computer

continued...

Comdex scenes: Clowning around with Amdek color monitor (1). M graphics with IBM PC (2). Desnet local network connects PC with mar expansion cabinet is PC lookalike (5). PC director of marketing out "preview issues" to play watch-the-birdie-watching-you (6).

in our booth for a do-it-yourself demonstration of his *QUICKPRO* software, which he described as an "automatic program writer." While Tamargo stood by to act as a human user's manual, we sat at our PC's keyboard with *QUICKPRO* and worked out a program to gather data from people making inquiries at our booth. Tamargo's software presented us, after a few preliminaries, with a display screen blank except for letters marking each line.

Using the letters to select lines where we wanted text to appear, we formatted an "input screen" with entries for NAME, ADDRESS and all the other facts we wanted to gather from our booth visitors. Tamargo showed us how to indicate the maximum space we wanted to allow for each of these entries, and what kind of information we wanted to permit in each, such as "numbers only." When we finished designing the input screen, *QUICKPRO* asked us for other details about the anticipated size of our files and how we wanted to organize them. On completion, the program crunched away for a while, then presented us with a nice little BASIC program to handle our booth-visitor files. The program had facilities to add entries to the file, change or delete previous entries, and go looking for facts that had already been entered.

Finally, Tamargo had us list our new BASIC program to the screen, and showed that it was a standard, ordinary program that could be edited and modified in any of the usual ways. What's more, as a byproduct of the data entry process, the program was liberally salted with remark statements documenting what each program section was doing. All in all, not a bad performance. (The program did run afoul of some editorial pet peeves though—in several places it required user typing, thinking or calculating when it seemed the computer ought to have been doing the work. Tamargo's reluctance to take advantage of PC's special features such as the "softkeys" also won no applause).

Peripherals Were Central

Over at the display of Micro Peripherals Inc. they were showing a dot-matrix printer they claimed would run rings around the one IBM sells. Their $849 printer was pumping out some very nice looking graphics, and the MPI people were

talking about doing some elaborate text printing where the letters would be done using a graphics rather than text approach—allowing italics, simulated script, proportional spacing and other appealing goodies. MPI has promised to lend *PC* one of these printers for further evaluation, and a report on it will be in a future issue.

Another item we admired at COMDEX has already arrived at the *PC* offices for a closer look—a Color II video monitor from Amdek. This monitor is of the "RGB direct drive" type and produces spectacularly crisp, clear and stable images. The improvement over the "baseband" type dispiay we had been using before is dramatic; text at the 80-column width is quite distinct and readable. It caught our eye at Amdek's booth not only because of the great picture, but also because the cabinet design and color fit so harmoniously with the PC. We'll have more on this and other color monitors in an upcoming issue too.

Awards for both a great idea and great graphics are due to a Silicon Valley company by the name of Destek, which was promoting its Desnet "iocai network" for interconnection of microcomputers. Desnet was being touted as "the key to computer city" and the accompanying artwork was uncommonly handsome for the computer world. The network arrangement, which connects into the PC and other microcomputers using a $100 plug-in card, will supposedly string together several different brands and models of computer into a system working as a unified whole. There was a demonstration that showed this on at least a superficial level, but it will take a more thorough look before we can figure out how much compatibility Desnet really creates.

M.B.A.s for Sale

In the software department, one trend we noted favorably was the appearance of integrated groups of programs that serve multiple purposes. The groundbreaker in this area is a suite of programs being sold under the name *MBA* by Context Management Systems of Torrance, California.

MBA was still in the working stages for an anticipated spring release, but we got a preview look at its combination of an electronic spreadsheet, data base manager, graphics displaymaker, word processor and communications handler. The idea, as Context's Gib Hoxie explained it, is that managers can go into a data base to draw out a selected set of facts, then "change contexts" to move those facts into the spreadsheet program. There they can manipulate them in typical "what-if" spreadsheet fashion, then change contexts again to display the results in graphic form. In theory, they might then switch contexts again to frame a memo around the digested data using the word processor. . . and ultimately use the communications handler to send the whole thing off to a colleague at another location.

At COMDEX, many of these ambitious offerings were on display only as an enthusiastic gleam in Hoxie's eyes. But we did see a demonstration showing good progress on the general theory—even including the ability to split the screen into multiple segments and show operations from four different "contexts" simultaneously. Context appears to have made a heavy investment in promoting their concept, and if a similar investment underlies their final development effort we shall have a finished Context product to teil you about before long.

More executive software for the PC was on display at the booth of Target Software, an Atlanta company recently acquired by Comshare, who makes software for big computers. Target's big gun is called *MasterPlanner,* and is described as an evoiutionary upgrade of earlier spreadsheet programs. *PC* was treated to an enlightening explanation by Target's Bob Ranson about the different design philosophies for such programs. Ranson described three categories he says the "gridsheet" programs can fall into—"cursor driven *(VisiCalc),* logic driver *(T-Maker),* and procedure driven *(Desktop Plan)*"—and showed how *Masterplanner* incorporates strong points of all. His comments will be expanded upon in our next issue, when we do a comparative evaluation of spreadsheet programs.

Challengers Begin to Gather

A last item of interest at COMDEX was the appearance of other microcomputers aimed at or near the PC's territory and with similar capabilities. Victor Business Systems introduced a desktop system built around the same 8088 chip as the PC. It is said to be capable of using software designed for the PC, though it can't read PC diskettes since the drives are incompatible. Its disk storage capacity is double that of IBM's machine, and the Victor also has an optional display format capable of showing much more information—132 columns by 40 rows.

A microcomputer introduced by Fortune Systems, a new company, had slick office styling of the same type as the PC's, and was designed around the allegedly more powerful 68000 processor chip. This machine garnered a great deal of attention from the crowds on the floor, and more will likely be heard about it. *PC* also took interested note of the Otrona Attache microcomputer, which we had plenty of time to view since their booth was right across from ours. The Attache, a portable microcomputer selling for about $3,700, packs a lot of power and appeal into an impressively small package. It seemed to us that people who admire the IBM approach to personal computers would find much to admire in this one if they absolutely had to have a portable.

As for all of the COMDEX exhibitors who had nothing to display for the IBM PC, it seemed like more than half of those we asked claimed they were in the process of getting something together.

With a year for them all to work on it, and judging by how much has happened in the first couple of months, COMDEX's second year of the PC Era promises to be full of worthwhile thngs to write about. And *PC*, naturally, will be there to write about it.

It's going to be exciting. In fact, it already is.

—Jim Edlin and David Bunnell

TecMates

Tecmar unveils a plug-in smorgasbord

THERE IS A SAYING THAT DEFINES *LUCK* as "the intersection of opportunity with preparedness." If that is so, then Tecmar, Inc., in Cleveland, is a very lucky company. Because when IBM presented them with an opportunity, in the form of the Personal Computer, Tecmar met it with seemingly faultless preparedness. The result, a mere three months after IBM's official announcement of the PC, was Tecmar's COMDEX announcement of 20 add-ons, expansions accessories and enhancements for it.

The company's ads could almost be headed, "Everything you always wanted

continued...

Comdex: The Year 1 PC

Martin Alpert, Tecmar president, showing off the TecMate line of 20 PC accessories.

to add to your IBM PC," except Tecmar didn't leave people time to have wanted anything for very long. The product line, christened "TecMates," includes:

- a plug-in clock/calendar module
- a BSR X-10-type device control module, and a stepper-motor controller
- a speech synthesizer module
- a module to let several PCs share a printer
- an expansion cabinet with a design matching the PC System Unit
- a Winchester-type hard disk system with controller card
- a video digitizer, and three modules for analog/digital conversion
- a selection of modules for various kinds of input, output and memory
- and aids to custom circuit-board design.

Tecmar president Martin Alpert says his company's preparedness was the result of previous work developing scientific and industrial electronics for use in microcomputer systems that are based on the Intel 8086 microcomputer systems that are based on the Intel 8086 processor. The 8086, he says, has the same internal architecture as the 8088 chip used in the PC.

When IBM announced the PC, Alpert realized Tecmar was well positioned to develop products for it. He began planning immediately. Alpert tells how Tecmar people flew to Chicago and "camped on the doorstep" of the Sears Business Systems Center to get two PCs on the first day they were available. "We got our logic analyzer on it and figured out the bus," he says. "It didn't take very long; it's very straightforward with only a few confusing lines." According to Alpert, between 40 and 50 people took part in getting the products ready for previewing at COMDEX.

While Tecmar does offer a hard disk system, software allowing it to be used under the PC-DOS operating system is still lacking. "We'll be talking to Microsoft about that very soon," Alpert said. He anticipated the hard disk system would be available for delivery toward the end of February, with all the other products available a month or two sooner.

A PC Twin

Perhaps the most striking feature of the TecMate line, apart from its breadth and its speedy development, is the expansion cabinet's design as a near-identical twin of the IBM System Unit. Tecmar has even copied IBM's color scheme; the only detectable difference (besides the nameplates) is a slight variation in the detailing of the front panel's small, slotted grille. Commenting on the close resemblance, Alpert said, "The IBM system has been done right, and everything we do has to be done right too."

The TecMate item that performs the neatest trick is the Device Master module that combines clock, calendar and the sort of device controller that sends signals over electrical wiring to activate lights, appliances and the like. According to Alpert, the module, which has its own battery power, can be used to control the outlet from which the Personal Computer itself receives power. The Device Master can store a command ordering the computer to be turned on at a certain time, then execute a command to turn the computer off, and then—using its own power—turn the computer back on at a preset time. Whereupon, if appropriate autostart software is in the computer, new times can be set and the whole cycle repeated. This trick, like those novelties whose switch activates a mechanical hand that then turns the switch back off, isn't particularly useful, but it is neat. We expect we will have many more practical uses for Tecmar's products to report on before long.

—Jim Edlin

Tecmar Inc.—23600 Mercantile Rd., Cleveland, Ohio 44122 216/464-7410

Mathemagic

A Reverse Twist: Turning Your Computer into a programmable calculator.

THE DEMONSTRATION STARTED DECEPTIVELY, like a juggler tossing one ball. Joe Luciano, one of the creators of the *Mathemagic* program, showed how his new software could take the formula 6 + 1 and—watch carefully now—actually add the numbers together to come up with (tadaa!) 7.

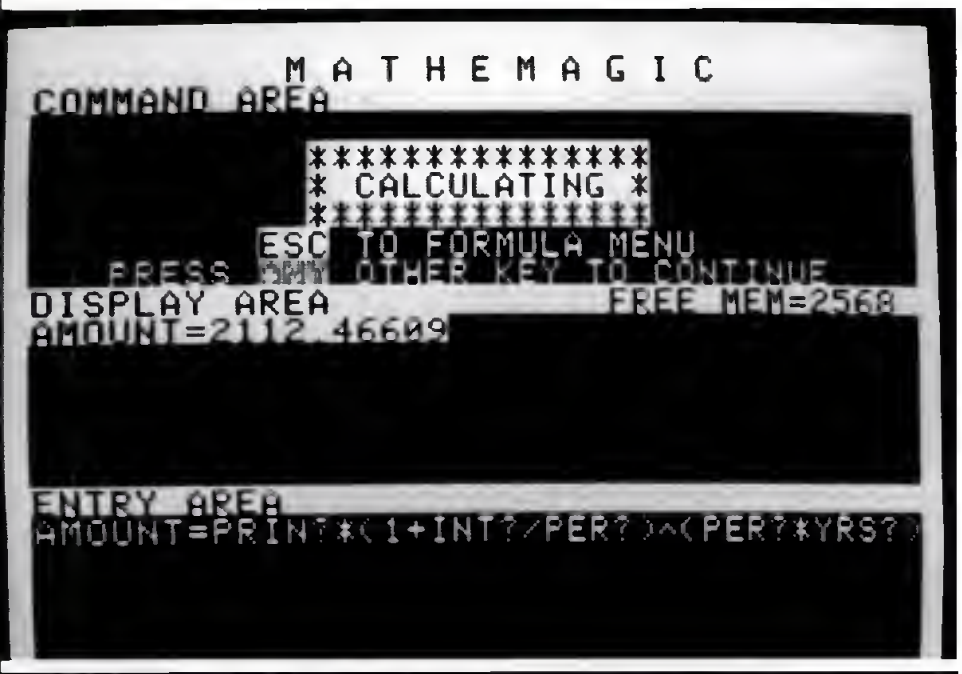
Wow! That's just what you spent thousands of dollars on your computer for, right? Well don't applaud yet folks, because the show gets lots more exciting. In the course of a 50-minute demonstration for *PC,* Luciano used his computer keyboard to have *Mathemagic* pick up one figurative ball after another until it seemed like a fountain of a dozen were coursing through the air. At the end of the show my applause was for real.

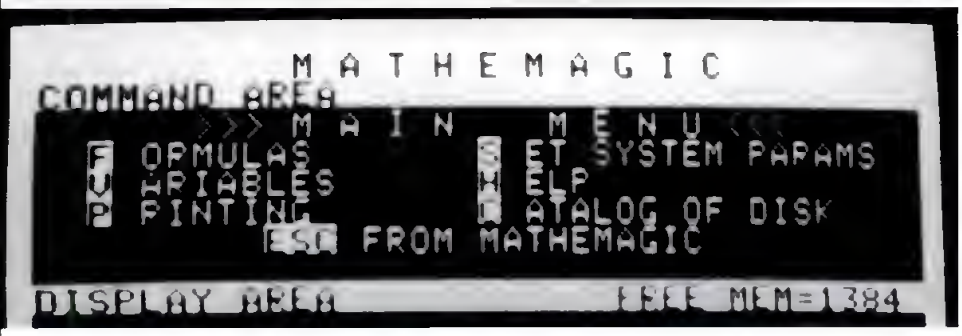
Mathemagic is billed as software to

"turn your computer into a programmable calculator." It does so, but that seems a superficial description of its powers. *Mathemagic* falls into the same gray area the VisiCalc program does—somewhere between being just an "application" program and being a full-bore programming language.

Mathemagic has a strong flavor of what computerists would call a "threaded interpretive language." That weighty phrase describes a simple concept familiar to anyone who has ever used a dictionary—where all the words are defined using other words defined elsewhere in the dictionary's pages. If "sneeze" is defined as "a blast of air from the nose" and you don't know what "blast," "air" and "nose" mean, you can flip to their respective pages and look them up. Then you can go on to look up the words in *their* definitions if the meaning still isn't clear, and so on. Defining one word in terms of others, down through many layers if necessary, is what makes this process "threaded," and flipping step-by-step to all those other pages is what makes it "interpretive."

Threaded computer languages (FORTH is one) are considered by many to be among the most advanced and powerful techniques for making computers responsive to human wishes. But it usually takes a skilled programmer to deal with their austere intricacies. *Mathemagic* delivers similar (though more limited) powers to anyone who can string together the sort of formulas found in high-school math.





The power of *Mathemagic* lies in the ability it gives you to define a formula, name it, then use the name to incorporate that formula in the definition of other formulas.

You might give the name SPEED to the formula ?DIST / ?TIME (the question mark means the program will ask you to type in the value it should use for the name, the slash indicates "divided by"). Separately, you could define WEIGHT as VOLUME * ?MASS (the * means "times"). A previously-entered formula could define VOLUME as ?HEIGHT * ?LENGTH * ?WIDTH. And a later formula could say FORCE = SPEED * WEIGHT. The calculation of FORCE would then be made step-wise using all the formulas defined earlier.

You may detect a similarity between the *Mathemagic* structure and a plain old BASIC program. They are akin, but for many purposes *Mathemagic* would be less complicated to use. *Mathemagic's* named formulas are not unlike BASIC subroutines, but it would take sophisticated program editing software and some deliberate thought to incorporate previously-written subroutines into a program for a new task. With *Mathemagic* you need only indicate the formula by name and new programs will apply it wherever called for.

Mathemagic runs by displaying three separate work areas on the computer screen—(1) a menu area that shows what commands you may give at each stage of the program, (2) an entry area that shows the formula you are presently creating or using, and (3) an answer area, which shows the progressive calculation then displays a final result after you have plugged all values into your formula.

First impressions suggest the program's authors have been very resourceful in designing the program to operate quickly and efficiently, but somewhat less successful at giving it true simplicity of use. The user has to do several tasks of typing, remembering or interpreting that, in a friendlier design, the computer would do for him. Since finishing touches for the program were still underway at the time of *PC's* preview, some of my complaints may not apply to the final version.

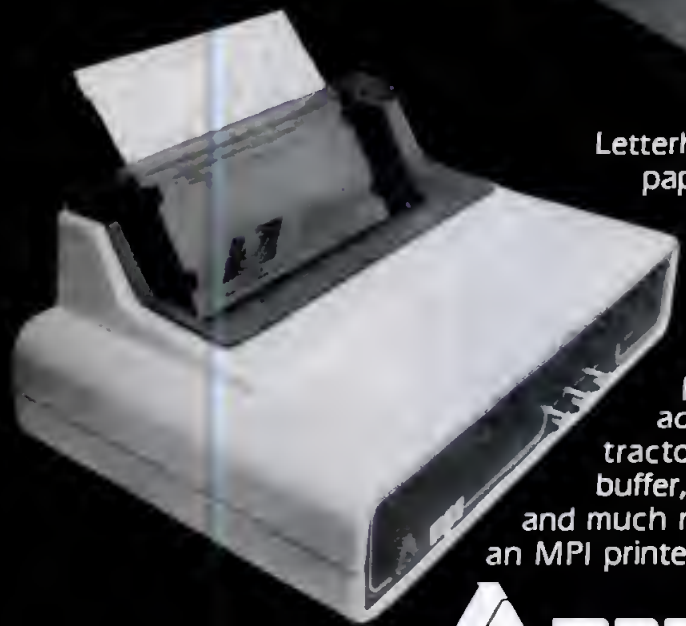
The program includes facilities for storing formulas and data on disk, and for printing out results with or without showing all the step-at-a-time intermediate calculations. One-step-at-a-time calculation can also be displayed on the screen, giving the program much potential for educational use. The printouts are designed to serve principally as written records of what calculation took place, and don't provide much leeway in formatting or including notes and comments for later reference.

Like VisiCalc and other spreadsheet programs, *Mathemagic* is a general-purpose product which can be adapted to many different lines of work and study, just by changing the formulas entered into it. Both are good for "what if" work, but *Mathemagic* is designed for linear, sequential calculations rather than the two- and three-dimensional grids the spreadsheets calculate. Obvious uses can be imagined for people working in the sciences, engineering, social sciences, the quantitative side of business, and wherever else numeric formulas are employed.

—Jim Edlin

International Software Marketing, 120 E. Washington St., Syracuse, New York 13202 315/474-3400

Easy.



Letterhead? Multicopy cut forms? Plain bond paper? Ditto masters? Try the Easy Feed single sheet paper load option with MPI's 88G and 99G printers. Just feed the paper in the front and watch it come out the top. No round platens to bend around or complicated paper paths to worry about. All this in addition to the standard adjustable width tractor drive, dot graphics, 1,000 character buffer, dual parallel/serial interface, dual fonts and much more. Another good reason to select an MPI printer.

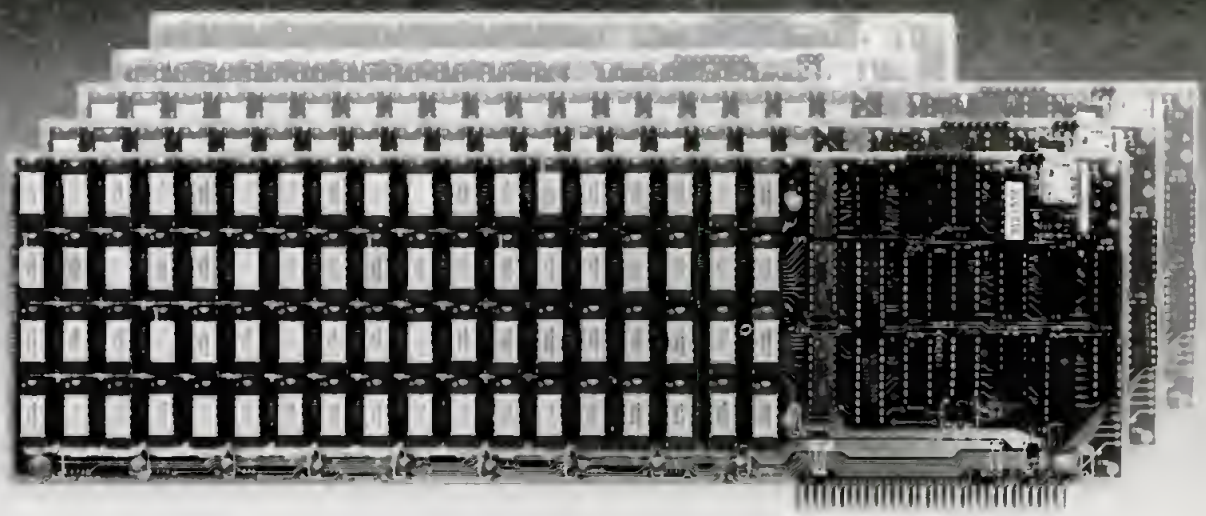
mpi

Micro Peripherals, Inc.
4426 South Century Drive, Salt Lake City, Utah 84107
Telephone (801) 263-3081
The Printer People

Arizona PLS Associates (602) 246-6477 • **California** VITEK (714) 744-8305 • Computer Potentials (408) 738-1740 • **Colorado** PLS Associates (303) 773-1218 • **Florida** Computer Village (305) 266-5965 • **Georgia** Micro Graphics (404) 790-5771 • **Illinois** CW Electronic Enterprises (312) 298-4830 • **Massachusetts** Butler Associates (617) 965-1080 • Consumer Computer Marketing (617) 443-5128 • **Minnesota** Bohlig & Associates (612) 922-7011 • **New Jersey** Hansen & Hughes (201) 652-7055 • **Ohio** ECS (216) 729-2222 • **Oregon** Microware (503) 620-8150 • **Pennsylvania** QED Electronics (215) 674-9600 • **Texas** Computer Wares (214) 373-4443 • Thorson Distributors (214) 233-5744 • **Utah** PLS Associates (801) 466-8729 • **Washington** Microware (206) 451-8586 • **International: Europe** Russet Instruments, Ltd. (0734) 868147 Telex 84972! • **Australia** Datatel Pty. Ltd. 690-4000 Telex AA30906 • **Canada** Norango (416) 498-5332 Telex 06966710 • **Mexico, Central and South America** Siscom-trol (905) 689-02-09

Great Memories Run In Our Family.

Making your personal IBM even more valuable.



64K — $495.00 128K — $795.00 192K — $995.00
256K — $1195.00 512K — $1995.00

Now CTI offers you and your IBM powerful memory-expansion PCBs with up to 512Kb storage per board.

With these versatile add-ons, you can increase your computer's memory to the highest, practical level of current technology — and do it with minimal demands on space and power.

Because only the finest-quality materials and construction go into our multi-layer boards, you are assured of both the lowest signal distortion and the best RFI performance.

Mapping ROM makes set-up fast and easy, with a choice of flexible memory configurations.

And you don't wait for delivery. Our five PCB memories are available now — in 64, 128, 192, 256 and 512Kb. Each can be obtained in an expandable version.

Whatever your needs may be, you'll find that our "product-family" approach to memory design and manufacture backs you with total operating-system support — before and after sale.

For complete details on our family's great memories, don't forget to return our coupon.

Dealer inquiries are welcome.

cti
965 W. Maude Avenue
Sunnyvale, CA 94086
(408) 245-4256
TWX: DOMESTIC 172509 / INTL 470582

I'd like to know more. Send information on:

- ☐ Memory-expansion boards
- ☐ Disk drives — floppies & hard disks
- ☐ Future IBM add-ons now in planning
- ☐ Dealer sales kits.
- ☐ Enclosed is my check for $_____. Please rush me one _____ Kb memory board. (California add appropriate sales tax.)

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

cti
965 W Maude Avenue · Sunnyvale, CA 94086 · (408) 245-4256
TWX Domestic 172509 / International 470582

Jean L. Yates and Dr. Rebecca Thomas

WHAT DO YOU DO WITH ALL THOSE COMPUTERS?

Or: Six Micros is Not Enough

EDITORIAL COMMENT: As a matter of pure happenstance, I live only blocks away from one of the most effervescent, brilliant and unusually outspoken personalities in Microdom—the nearly indomitable Jean Yates (a name almost anyone who follows this industry will recognize, as her prognostications have appeared everywhere from Time *to* The Economist *to* The Wall Street Journal*). I say* nearly *indomitable because I witnessed the time when Jean met her match, in the form of my 12-year-old stepdaughter, Jennifer Poitier. There were six of us sitting at a table at one of San Francisco's finest Chinese restaurants, Tien Fu, when the exchange of barbs and witticisms began. For a full hour-and-a-half, Jean and Jennifer engaged in a conversational duet that left the rest of us stunned and speechless. If ever there is a true national TV show about microcomputers (The* ComputerWorld *entry is not it), these two should be hostesses. In the meantime, it is important, I think, for readers of PC to become acquainted with Jean Yates, whose insights into this business are sought out by major companies and publications throughout the world. Jean's long-time associate, Dr. Rebecca Thomas, known as "Becca" to her friends, is a refined person who sits at Jean's side with a wry smile and usually doesn't get much involved in the conversation. However, for those of us who have gotten to know Rebecca, it is obvious that she is a vital cog in the wheel that keeps Jean's mind spinning to ever-new insights. Personally, I think Jean and Rebecca are equally brilliant and I am pleased that they agreed to write a column for PC. I hope you agree.* —DHB.

Many of the people we meet, both in and out of the computer industry, ask us at some point, "Do you own a personal computer?"

"We own six," we answer (give or take a few depending on what we're up to).

"So what do you do will with all those computers?" is the inevitable response.

Since this is a question that a lot of people considering buying a system ask, and since many IBM PCers are new to personal computing, we would like to share some of the things that make our six computers indispensible to us.

Our use of personal computers breaks down breaks down three ways: home, business, and hobby.

As far as home use is concerned, we maintain our personal checkbook, credit card and other records, categorizing them by deduction. Then the computer prints a listing at the end of the year for each category of the long form, and we just fill in the blanks. We own an Apple II and an Atari game computer, and use them for playing computer games and accessing timesharing facilities that have lots of interesting home-oriented features. Timesharing with "The Source" or other consumer "teletex" facilities gives us access to services ranging from restaurant guides for major cities, to hundreds of games, to electronic bulletin boards on many topics, to educational programs for children and adults.

Telephone and address lists are kept on our computers, and we also use a program that simulates a datebook to schedule appointments. It looks ahead and tells us if the time is free, and we can keep track of everyone's schedules when planning meetings or meals.

We have a large mailing list, divided into several categories. Some are personal, some are personal business, like credit card companies and banks, and others are lists for charitable organizations for which we have volunteered to maintain their mailings and accounting records.

Recently, we implemented a computer program that lists our insured property, both personal and business. We sent a copy to the insurance company and put a copy of the disks in a safety deposit box. When the list needs changing, a printout of it can be updated. When writing off depreciation on business equipment, this list will be used again.

The business uses made of our computers are numerous.

We have two Vector Graphic computers, which are used for letter and manuscript writing (word processing), for recording and managing the large files of literature that we maintain on the microcomputer industry, and for accounting functions. Although our "database" of files is on computers, the same things could be done to manage inventories or files of information on your company's interests.

We estimate that we have written almost 5,000 pages of published text on our computers. This ranges from books to market research texts to newsletters to magazine articles. We keep the articles and books on an electronic index so that pieces of one that are relevant to a new project don't have to be started from scratch. This saves a lot of time.

You may have heard of VisiCalc™, a program available for the IBM Personal Computer that lets your perform "what-if" analyses. We use a program like VisiCalc to perform financial modeling and forecasting functions for our own company and for our clients. It's particularly useful when combined with a plotting program that turns the data into graphics, which can be printed out or photographed for slides for presentations. We find it much easier to understand trends when we use "what-if" programs and then look at the graphic representation.

Rebecca and her coworkers in programming use two of our systems for development work. They contain more complex 16-bit microprocessors and operating system programs. She uses them to write books as well, actually writing about the programs that run the computers. That's how we wrote *The User Guide to the UNIX System*, an introductory text from Osborne/McGraw-Hill.

People say that we are unusual, two women with so many computers, but we feel that we have just found an interesting and lucrative way to experiment with computers and include their efficiency-adding properties in our lives.

STOP

Are You a PC subscriber yet?

It only takes a second to become one.

PC subscribers save money.

And not just the 33% savings over the newstand price of PC. PC reviews of products and services for IBM Personal Computer users help you make INFORMED purchasing decisions. And PC's new product listings keep you abreast of developments throughout the industry.

PC subscribers have it easy.

Every informative issue of PC is delivered right to their doors. There is no risk that a PC subscriber will miss any of the valuable information published in PC—information that is not available anywhere else.

PC subscribers enter the drawing.

Every PC subscriber is entered in our drawing for a free IBM Personal Computer. The drawing is our way to encourage you to subscribe NOW, before the second issue of PC hits the stands in March. Complete drawing details are outlined on page 81, and you don't have to be a PC subscriber to win the drawing.

Now is the time to do it—subscribe to PC with the cards on page 81. At $12, you can't really afford not to.

PC

WITH TCI's NEW SOFTWARE, I SIMPLY BREEZE THRU MY WORKLOAD

Thanks to two innovative new software products from TCI, the time I spend at my IBM Personal Computer needn't interrupt my social calendar.

In fact, these new systems allow control of both business and social needs. TCI's AGENDA® assists in keeping track of the total schedule (business and pleasure) while TCI's MAILTRAK® manages business mailing as well as club directories. And at these prices, you owe it to yourself to try them.

Agenda™

Have you ever forgotten an important event? Scheduled two meetings at or near the same time? These problems are solved by the AGENDA system that tracks all of your personal and business time. You simply enter data on scheduled meetings, projects, holidays, reminders, and dates to remember (birthdays, anniversaries, etc.) and AGENDA does the rest. There is an automatic check of tightly scheduled days, a perpetual calendar, and a preview of coming days, weeks, or month-at-a-glance either on your display or a printout to carry with you. User defined expenses can be tracked day to day. AGENDA even provides continuous clock display and alarm when on-line. Can handle up to 3,000 separate records. (Requires 64K, DOS, printer, and either 40 or 80 character display)

$65 includes diskette, manual, and shipping
$15 for manual only (refundable on diskette purchase)

Mailtrak™

Clubs, churches, sports teams, prospects, sales lists, membership organizations, fraternities, alumni, neighbors, volunteers... Whatever the list, it can be managed on TCI's MAILTRAK. Full name and address information (first and last name, two address lines plus city, state, and 9 digit zip), two phone numbers, five user defined mail codes, and four activity dates with user defined activity codes. On-screen editing and updating. Output includes phone directories, master list, mailing labels (user selected format), file labels, and output file for IBM Easywriter program. Sort and select capabilities draw on all information to suit your specialized needs. (Requires 64K, DOS, Printer, and either the 40 or 80 character display)

$65 includes diskette, manual and shipping
$15 for manual only (refundable on diskette purchase)

Call or write today for more information.
VISA and MasterCard accepted.

for prompt delivery– Use our 24 hour Hot Line

TCI Software 6107 West Mill Road, Flourtown, PA 19031 **215-836-1406**

PC for a Publisher

Andrew Fluegelman of Headlands Press

IN THIS CONTINUING SERIES, PC WILL REPORT ON THE people who are using IBM Personal Computers and on the uses they are making of them.

Andrew Fluegelman is the owner and sole staff member of The Headlands Press, an independent book-producing firm located in Tiburon, California. He is also one of the first owners and users of the IBM Personal Computer.

Fluegelman purchased the computer in late October, receiving one of the initial group of PCs distributed by ComputerLand of San Francisco.

Jeremy Joan Hewes

His system includes the PC with 64K of memory, two disk drives, the monochrome display, and the asynchronous communications adapter. In addition to the BASIC that comes with the computer, he has purchased the EasyWriter word processor and the VisiCalc electronic worksheet program. Subsequently he added a letter-quality printer, although he worked with only the computer and disk drives for the first few weeks of operation.

As a member of the publishing community, Fluegelman is aware of the computer's increasing applications to his field, and he believes that his unique position as a book producer makes this technology even more appropriate for his business. "I'm running a book-producing company and operating out of the mainstream—on the West Coast, as an independent. I perceived that for me to stay competitive in my field, I had to be on the front of the

Illustration by James Mc

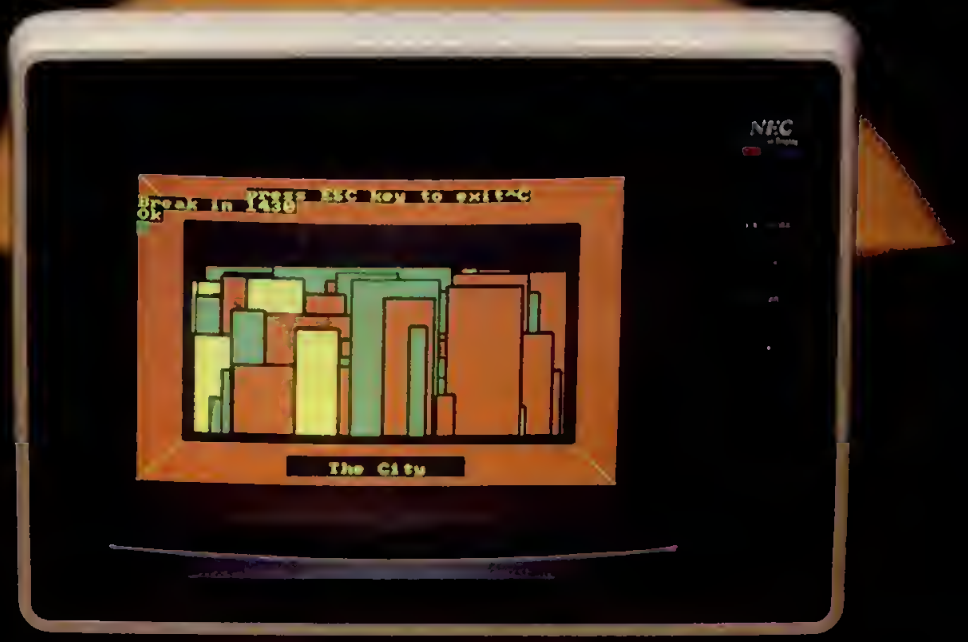
"It almost instantly felt like an extension of myself . . as though I had 2,000 extra brains grafted onto my skull."

technology; I couldn't afford to be left behind by it. I also feel that publishing is going to be affected tremendously by computer technology, and I had to know about it and be in that arena rather than out of it."

In his role as an independent producer, Fluegelman takes a book from the idea stage through the writing, design and typesetting phases, and often through the printing as well. Before commiting his major resources to a project, however, he makes a publishing agreement with one of the national firms, such as Doubleday or Penguin. The large publisher then contributes toward the costs of producing the book and distributes it nationally. The national firm's name is on the cover as publisher, and Headlands Press is credited on the title page, or given what is commonly called an imprint. Among the books that bear the Headlands imprint are *The New Games Book, More New Games* and *How to Make and Sell Your Own Record.*

continued

Look What Apparat has for your IBM Personal Computer.



Apparat announces our initial line of add-on boards for your IBM Personal Computer. We are committed to further product introductions to enable you to build on your new IBM system.

Add Functionality and Capability with These New P.C. Boards

Apparat has the following products available for delivery in the first quarter 1982:

Prom Blaster will program most 1K to 4K byte EPROMS of 25XX and 27XX single or multivoltage type. Complete with personality modules and read/write software. Priced at $149.00.

Clock Calendar features seconds, minutes, hours, day of week, date, month and year. Backup battery, leap year and crystal time base. Priced at $129.00.

Protype Card 3.5 by 8 inches wirewrap area holds over 150-14 Pin Dips. Priced at $29.95.

RGB Color Monitors choose from NEC, AMDEK and TECO CRTs. Priced at $1.095.00 for the NEC and $999.00 for AMDEK. TECO available in April 1982.

More Products Coming Soon

Apparat has more products for your IBM system in production and ready for introduction in the second quarter 1982: 3rd and 4th add-on disk drives expansion cabinet houses up to two IBM compatible drives. Priced at $499.00 for cabinet and one 160K drive, two drives at $749.00.

Combo Card parallel printer, ASYNC communication (RS-232), and clock calendar multipurpose adapter.

64K byte hardware print-spooler – (with parallel printer adapter) buffers 13 minutes of print output (at 80 characters/second).

300 Baud Modem Card with ASYNC serial adapter.

Apparat will continue developing add-on products to support your IBM Personal Computer. Call today to find out more information about the above products or to order yours. Dealer inquiries welcome.

(303) 741-1778

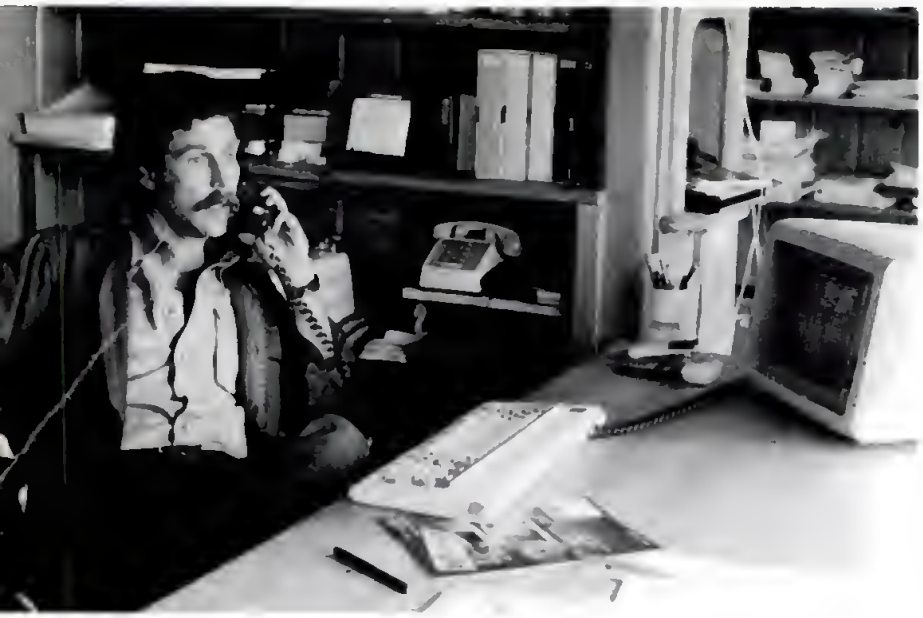
IBM Personal Computer is a trademark of IBM.

VISA

Apparat, Inc.

4401 So. Tamarac Parkway, Denver, CO 80237 (303) 741-1778

"ON GOING SUPPORT FOR MICROCOMPUTERS"



Jaqueline Pottier

For all practical purposes, then, Headlands Press operates as a conventional publisher in the way it develops a concept and manuscript for each book. This generally requires many letters, memos and book proposals, not to mention at least two or three drafts of a manuscript before the editorial process is complete. Consequently, the savings in time and money that word processing could provide, as well as the ease of writing and revising his own material, were obvious to Fluegelman.

New Projects Easier To Take On

"Because I have this capacity to deal with written material in a more efficient way," he points out, "it's easier for me to think of taking on new projects. Previously a manuscript would come in and I'd look at it and say, 'Well, how much revision is this going to take?' or 'How many drafts is this going to have to go through?' And all I would see would be a pack of proofreading and drudgery and trouble. It seems easier to deal with that now. I'll have it put on a word processing system and maybe have a basic edit done, and then get the manuscript back on my system and look at it. Word processing encourages the nth revision."

This capacity is a distinct departure from old methods of dealing with manuscripts and deadlines, he reports. "There were so many times in previous books when ways of making it better were passed up because it was just physically too difficult or the deadline prevented it. And that's a power that I see coming to my business with the computer—I can make all the changes that will make my writing better and the manuscripts I produce better."

Fluegelman's commitment to buy a microcomputer was sealed when he decided to be producer and co-author of a book about writing with computer technology. (This book, called *Writing in the Computer Age,* will be published late this year.) "Doing this book was the motivation to walk into the store and buy the computer. I've said that I needed a computer in my business because I perceived that this technology is changing the nature of publishing. And that is also true for writing. When I had the realization, it led me to see that the nature of writing itself is being transformed. Many people are going out to buy word processors for their specific needs or find that they have ended up with word processing because they bought a computer and have this capability. But people have not yet looked at—or relooked at—the nature of the writing act, the writing craft, and what it is like now that they have this new tool. That's the subject we're addressing in this book, and I think that it will be of help to writers who are thinking about using word processing in their writing. But it will also be helpful to writers who have systems and maybe have learned the particular commands but haven't had the benefit of all the tips that we are collecting from many, many users."

Behind The Decision

Like many major decisions that a businessperson makes, the seemingly "instant" impetus for Fleugelman's computer purchase had a somewhat more lengthy history. He recalls that he attended one of the early computer fairs in San Francisco about four years ago, with the intention of learning about the relatively new phenomenon of personal computers. "But here was all this stuff, and words that I didn't know—even the term 'floppy disk' was intimidating then. There were all these poeple, totally involved and engrossed, and I realized that I did not know the first thing about putting together this information. I came away feeling that I was going to have to learn how to operate a soldering gun before I was ever going to get into the computer world."

But as his understanding of the utility of microcomputers to publishing and writing increased, so did his motivation to learn the language and conquer the technology. "When I had a tangible, practical use for the technology, I had to start assimilating information—to understand what storage was about, what operating systems were, and what different types of software were available." He found that two books were especially helpful to him in this orientation: Adam Osborne's *The Business System Buyer's Guide* (Osborne/McGraw-Hill) and *Crash Course in Microcomputers* (by Louis Frenzel; published by Sams).

Then he began visiting stores and using a friend's word processor to get the feel of the technology. Fluegelman pursued this careful, rational course for several weeks last summer, at just about the time that IBM announced its Personal Computer. As part of his search, he went to see IBM's display model of this system.

"This Is It—This is The One

"After at least two months of going into stores, looking at machines, poring through the depths of Byte and every other magazine, trying to assimilate and evaluate all the information, I really took one look at the PC and said, 'This is it—this is the one.' And it was not rational at all. I was pleased to find when I investigated the specifications that they were good and that the PC does seem to be adaptable and upwardly mobile. I feel that anything I'm likely to want to do is going to be possible with this computer."

One reason for his knowing right away that this was the computer he wanted is the design of the machine. "I think its esthetics are great. I believe that something you interact with every day, especially if it's going to become an extension of yourself, should be pleasing from an esthetic or design point of view. It's important that you'll enjoy spending time with it."

One of the most appealing features for his use of the computer is the detached keyboard. "For me as a writer, the

continued

minimal nature of the keyboard is a plus. I plan on doing a lot of writing with the keyboard sitting on my lap, without the rest of the machine sitting in front of me. It gives me the chance to not be confronted by lots of machinery and equipment all the time. That's a big plus to me."

Perhaps the principal attraction of the PC for him, though, is its manufacturer. "One of the things that motivated me to buy the IBM PC," Fluegelman explains, "is that it has obviously been consciously created as a consumer product—and as near as I can figure out, a well-thought-out consumer product. I have no special good or bad feeling about IBM as a company, but for a huge firm—especially one that has the reputation for doing things right—to be a making a major investment in an uncharted area, I just had to believe that they have carefully created an integrated system that was going to work right and that was going to be satisfactory to me as a product. I had the feeling that I wasn't buying any strange surprises—that the whole thing was going to work without my having to pick up a soldering gun. And if the whole thing didn't work, that IBM would somehow take care of it."

Knowing that he would be working on a book about word processing, he ordered the PC and found the ComputerLand salespeople very helpful in getting his system to him as soon as they received the machines. There was a slight delay in his receiving the EasyWriter program, however, so he began working with BASIC and VisiCalc.

PC Was Immediately Useful

Even without the word processor, Andrew found that the PC was immediately useful to him in his business. "I've been amazed at how useful it's been already," he notes. "The VisiCalc program is very valuable in keeping track of my financial information, especially because my business is unusual in that my finances are very low volume in one sense—I don't have 10,000 customers—but very complex in that almost every one of the 30 to 50 checks I write each month has to be accounted for separately. I've got a dozen book projects, and I have 20 to 30 expense categories, and I need to account for every one of them. So where many small businesses are characterized by a large volume of routine transactions, my business is characterized by a small volume of complex transactions."

"I set up VisiCalc to keep track of my cash flow items for the next year-and-a-half; I made assumptions of what sales would be, what royalties would be, what my overhead was likely to be. Before I programmed in all that information, I really thought in terms of saving money—if I do this myself, will it save money because I won't have to pay a bookkeeper for so much time. But what I realized instantly when I had the information in the computer is that the control that I have over this information is of such a different dimension that it is just not comparable with my old bookkeeping system. The ease of moving and playing with that information gives me an insight into my business beyond what I possibly could have ever done by hand, and just having that is worth half of what the whole system is costing me."

Another immediate business use he has made of the PC is to write his own accounting program in BASIC. "The program I'm writing now in BASIC is going to write the checks for me, keep the checkbook balanced, and print the ledger. I've got the main part running; it's just left for me to put the little features I want into it. I pretty much made it up out of thin air; I copied a business program out of a book, but it was so far away from the way I wanted my books to be that I just abandoned it. But it helped me get a handle on how to program using random access files, which is really sticky. It took me a while to get a handle on that."

Considering that the PC is his first computer and that he had used it for only two weeks when he began writing this program, Fluegelman's experience seems quite unusual. "Maybe I just learned to write a program by enthusiasm," he suggests. But he has put in a good deal of time and study, and the process of writing his own accounting program has been one of intense experimentation.

200 Hours of Learning Time

"I read Bob Albrecht's book (*BASIC: A Self-Teaching Guide,* by Albrecht, Finkel, and Brown; published by Wiley) when I was traveling recently, and then I studied a book of BASIC games to see what programs were really like. This was before I had the computer, so I could only read about programming. And I've put in a lot of hours—I'd say I've spent 200 or 300 hours learning this stuff.

"One day I wasn't quite getting this ledger program the way I wanted it. I was using a function that tells you where in the random files you are, and I just kept getting weird results. It had a pattern to it, but it just didn't make any sense. I was so frustrated—I had tried everything I could think of to make it work right. So I called Microsoft in Seattle (the producer of BASIC for the PC) and ended up speaking with the guy who spend a year adapting BASIC for this machine. I told him about the problem and asked him what to do about it. He gave me an insight into what might be happening, and it instantly made sense to me. It was something that was not covered in the manual. I was glad to have the answer, and I was thrilled to be able to describe the problem to an expert after only two weeks with the computer."

One "Glitch" So Far

Fluegelman has had one human-induced "glitch" so far—and has learned an important lesson from it. "All the people I talked to and everything I read about working with the computer said 'save your work, save your work,' but I don't think there's any way you can ever appreciate that advice until you've spent the last two hours assembling and recording some financial information and you open your file drawer to get the last piece of data that you need, and the drawer kicks the plug out of the wall, crashing the machine to a halt and fading all your data into ether."

Despite that time-consuming error, Andrew Fluegelman is feeling none of the intimidation or apprehension that marked his first step into the computer world. "I think that what keeps 95 percent of people feeling weird about computers is learning how to boot the machine—how to get the thing running. You sit there in front of it, and you don't know how to get it started. You're afraid that it's going to snap at you or gobble you up or go up in smoke if you don't do the right thing. And I think the other great fear—and I'm speaking as someone who was one of those outsiders—is that when you get it running, it's going to lead you into some 'black hole' that you won't be able to get out of.

"2,000 Extra Brains At My Command"

"But when I started playing with my computer," he continues, "I stopped feeling that it was a machine that was doing things to me; it almost instantly felt like an extension of myself. It was as though I had had 2,000 extra brains grafted onto my skull. I really had that feeling—here are these extra brains, and they're really at my command, for me to string together or build together in any way that I choose."

Would you or someone you know be a good subject for a PC Profile? PC welcomes suggestions for people to be featured in this series—anyone whose use of an IBM Personal Computer would prove interesting or helpful to readers. Send your recommendations, including up to 50 words explaining why, to PC Profiles, 1239 21st Avenue, San Francisco, California, 94122.

FORTH

Complete FORTH progrom development systems for the IBM® Persanal Camputer. Packages include interpreter/campiler with virtual memary monogement, line editor, custom screen editor, ossembler, decompiler, utilities, file ond record occess modules, ond many demonstration programs. 100 poge user monuol. Optionol flooting point orithmetic extensions and cross campiler available.

Ready to run under PC-DOS ar CP/M-86®. Standalone version available soon. 64 kbytes RAM and twa disk drives recommended. (IBM is a registered trodemork of Internatianal Business Machines Corp. CP/M is o registered trademark of Digital Research, Inc.)

Laboratory Microsystems
4147 Beethoven Street
Los Angeles, CA 90066
(213) 390-9292

WARNING!

Electric Power Pollution. Spikes & Lightning HAZARDOUS to MICROCOMPUTERS!!

Pstented ISOLATORS provide protection from . . .

- **Computer errors caused by power line interference**
- **Computer errors due to system equipment interaction**
- **Spike damage cased by copier/sievstor/air conditioners**
- **Lightning caused damage**

Pat #4,259,705

**** FULLY GUARANTEED****

- **ISOLATOR (ISO-1) 3 isoisted 3-prong sockets; Spike Suppression; useful for smeil offices, laborstories, classrooms. $69.95**
- **ISOLATOR (ISO-2) 2 isoisted 3-prong socket banks; (6 sockets totsl); Spike Suppression; usetul for multiple equipment installations. $89.95**
- **SUPER ISOLATOR (ISO-3) similar to ISO-1 except double isolation & oversize Spike Suppression; widely used for severe electrical noise situations such as factories or large offices. $104.95**
- **SUPER ISOLATOR (ISO-11) similar to ISO-2 except double isoisted socket banks & Oversize Spike Suppression; for the larger system in severe situations. $104.95**
- **MAGNUM ISOLATOR (ISO-17) 4 Quad Isoisted Sockets; Multiple Spike Suppressors; For ULTRA-SENSITIVE Systems in extremely Harsh environments. $181.95**
- **CIRCUIT BREAKER, any model (Add-CB) . . . . . Add $9.00**
- **CKT BRKR/SWITCH/PILOT (-CBS) . . . . . Add $17.00**

AT YOUR DEALERS **MasterCard, Visa, American Express**
ORDER TOLL FREE 1-800-225-4876 (except AK, HI, PR & Canada)

Electronic Specialists, Inc.
171 South Main Street, Natick, Mass. 01760
Technical & Non-800: 1-617-655-1532

IBM PERSONAL COMPUTER SOFTWARE FROM QUANTUM SOFTWARE SYSTEMS

QUNIX™ — A multi-tasking, multi-user *Unix-like operating system

- C COMPILER
- 8086 ASSEMBLER
- SYSTEM UTILITIES
- TEXT EDITOR
- LINKER, LOADER
- TEXT FORMATTER

ALL AVAILABLE NOW

For further information for personal and OEM usars, please writa:

IN U.S. AND ROW:
QUANTUM SOFTWARE SYSTEMS, INC.
7219 SHEA COURT
SAN JOSE, CA 95139

IN CANADA:
QUANTUM SOFTWARE SYSTEMS LTD.
P.O. BOX 5318, STATION "F"
OTTAWA, ONTARIO, CANADA K2C 3H5

* UNIX is a trademark of Bell Laboratories.

WHO?

Who are Digital Research, SORCIM, Compiler Systems, ISA, MT MicroSystems, and Lifeboat Associates? They're among the leading software developers for the IBM PC.

WHAT?

What high performance development systems do they use?

CompuPro SYSTEMS

(Even IBM uses CompuPro system components!)

WHERE?

Where can YOU get development systems?

G&G ENGINEERING

13708 Doolittle Drive, San Leandro, CA 94577 (415) 895-0798

WHEN?

NOW! G&G has installed numerous fully integrated CompuPro based development systems for the IBM PC.

WHY?

FLEXIBILITY. CompuPro's 85/88 CPU runs CP/M® 80 & 86 or MS-DOS. We offer WORDSTAR, dBASE II, TRANS86, XLT86, ACT86, SUPERCALC, CBASIC, MBASIC, MFORTRAN and more!

COMPATIBILITY. We can read and write any IBM PC disks.

SPEED. Our 8088 CPU runs faster than IBM's 8088.

STORAGE. Up to 1 Megabyte of RAM, quad density 5¼ and 8 inch floppies, plus 20 Megabyte hard disks.

RELIABILITY. G&G systems have earned a reputation for reliability. We warrant our mainframes for two years.

HOW?

Drop us your name (we've dropped a few ourselves). We'll tell you how.

13708 Doolittle Drive, San Leandro, CA 94577 (415) 895-0798

See us at Booth 1538 C at the 7th West Coast Computer Faire

Book Excerpt

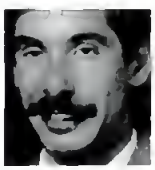
DON'T! By Rodnay Zaks

In his preface to DON'T (Or How To Care For Your Computer), *author Rodnay Zaks notes, "It is true that personal computers have become so simple that anyone can operate them with no prior training, and without any real risk—at least in the beginning."*

"However," Zaks continues, "if a computer is used for business purposes, suitable precautions must be taken to safeguard information and insure reliable operation." DON'T *is a book of detailed advice about such precautions. Zaks says, "The operative word is generally DON'T! hence the title. Quite simply,* DON'T ...unless you know what you are doing."

The book's thirteen chapters offer DON'Ts (and some DOs) concerning printers, software, security and other essential matters. Especially for IBM PC owners who are new to personal computers, the following chapter about floppy disks from DON'T *could help avert anything from aggravation to disaster. (Old hands pay attention too; Zaks points a finger at many sloppy practices indulged in around the PC offices.)*

DON'T! (OR HOW TO CARE FOR YOUR COMPUTER), by Rodnay Zaks—Sybex, 1981—244 pages.



Dr. Rodnay Zaks, president of Sybex, Inc., is the author of numerous books on all facets of computers, including Your First Computer.

Introduction

FLOPPY DISKS ARE PROBABLY THE main cause of failures in any computer system that uses them. Nearly all such failures are caused by user mishandling. These failures can be prevented by respecting the rules presented in this chapter. A careful reading and understanding of the information presented in this chapter will probably eliminate 75% of the failures that are apt to happen on a computer system with floppy disks.

Failures due to diskette mishandling usually have tragic consequences. They can destroy crucial data or cause strange symptoms that are hard to diagnose.

Here is a typical horror story.

In order to start Computer System A, a diskette is inserted into one of the disk drives, and a command is typed at the terminal. Normally, the effect of this command is to load the contents of a program from the diskette into the computer's memory.

Unfortunately, one morning, the computer system, which was operating perfectly

For the Home Computer User

The main rule is:

Back-up each important diskette before using it.

Other important rules are:

- Respect the physical and magnetic integrity of the diskette: Don't touch its exposed surface. Don't fold it or compress it. Don't place diskettes near magnetic coils or magnetized objects.
- Label the diskette promptly. Don't use a hard-tipped pen.
- Maintain the proper environment: avoid heat and dust.
- Read this entire chapter. It is the most important one for you if you use diskettes.

up to this time, began to resist all attempts to load from the diskette. As a result, no work could be done on the computer. The maintenance person was called in, showed up the next day, took the computer apart, reassembled it, and mumbled something about a bad contact in the XYZ unit. The computer began operating again.

A few weeks later, a new problem occurred; this time, the computer started properly. However, the data file containing all the customer names could no longer be read. After replacing a few boards inside the computer, all in vain, the maintenance man concluded that the software was bad. In this "fortunate" case, the company that provided the software determined that the software was good and suspected the diskette that held the customer names. After much debate between the hardware supplier and the software vendor, the conclusion was drawn that both the hardware and the software appeared to be working, but the data file was bad.

To make a long story short, one of the computer operators had used a ball-point pen to label the diskettes. In doing so, the operator damaged the contents of the diskettes by applying pressure against their cardboard jackets. With the pressure of a pen, dust present inside a jacket is imbedded on the diskette, thus damaging it. The first time the pen was used, the main system diskette used to store the operating system was damaged. The second time, an essential data diskette was damaged. Unfortunately, the damage that had occurred to the data diskette was not immediately detected, and the offending operator was not around when the system failed. Easy diagnosis was no longer possible.

This story illustrates the "time bomb" effect that can occur when operators mishandle the equipment. The problem could have been easily prevented had the operator been trained in proper diskette handling. The hardware and software both operated correctly; the problem occurred because of an inadequately trained operator who damaged several diskettes in an almost unnoticeable way.

To avoid the "time bomb" effect, proper discipline must be used and enforced for the handling of diskettes. Remember that most actions that damage a diskette do not damage it in a way that is immediately visible. For example, contamination by dust or physical damage may not be detected until days or even months later when the affected area of the diskette is read by the disk drive. At that point, the computer might be fooled by incorrect information on the diskette and, consequently, irreparably damage the entire contents.

Once you understand the proper precautions that must be used when handling a diskette, you can avoid many problems by simply using common sense.

Understanding Your Diskette

We will now present the main definitions relating to diskettes, examine the main techniques used for recording data, and discuss the techniques for retrieving the information that was recorded. We will then proceed to the proper handling of a diskette. Let us examine first the diskette itself, then its jacket.

The diskette is flexible and constructed of mylar material, coated with a magnetic oxide. It is enclosed in a square jacket, and rotates inside the jacket when being accessed. The jacket is lined on the inside with a special low friction material that automatically cleans the diskette by trapping dust particles.

Data Recording

Data is recorded on the disk in binary format as sequences of 0s and 1s (bits), and stored as magnetic patterns along concentric circles called *tracks*. A regular 8 inch diskette generally has 77 tracks, while a 5-¼ inch minidiskette can have 35, 40 or 77 tracks per surface. As shown in Figure 3.2, information is structured in *sectors* along the tracks. A whole sector is always read or written at a time, and all data on the disk is identified by a sector number and a track number. Each track can be accessed by moving the head of the disk drive along a radius of the disk.

A mechanism must be provided so that the disk drive may identify any given sector on any track. We have already seen that one of two techniques may be used for this purpose: hard sectoring and soft sectoring.

The read/write head of the disk drive operates like the head of a tape-recorder. The head is applied against the disk surface, while a felt pressure pad is applied against the other side. Any defects in the disk surface, such as dirt or creases, will thus cause loss of information.

When a disk drive is misadjusted, or when the head is dirty, the surface of the diskette is generally damaged, resulting in shiny rings on the surface of the diskette. Inspect your diskettes regularly for such clues.

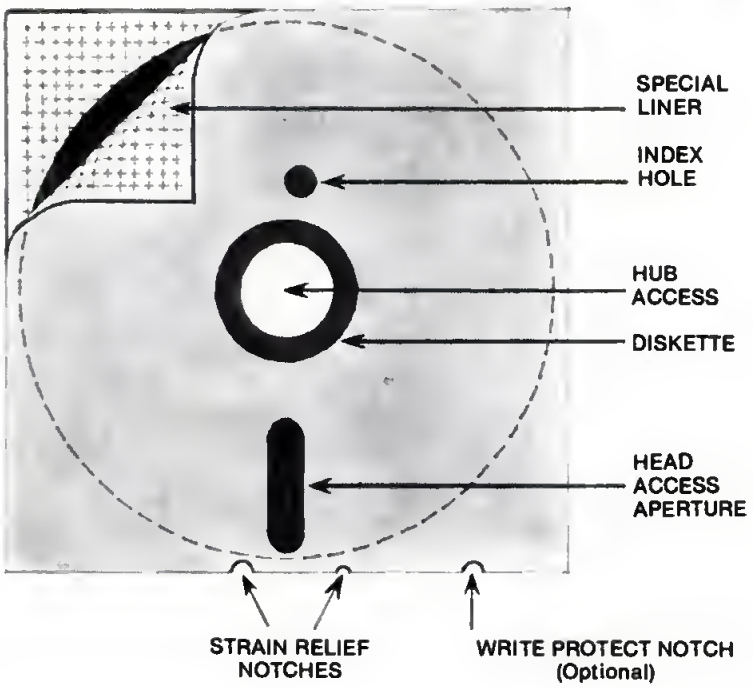
We have already seen that data may be recorded in one of two formats. Data may be recorded at the surface of the disk either in a single-density format (3,408 bits per inch or bpi) or in a double-density format (6,816 bpi).

The jacket containing the diskette has several roles: protecting the diskette, allowing access to the drive motor and to the drive sensors. These roles are accomplished by the special jacket liner already described and by specialized openings. These openings will now be described.

The Jacket

The jacket has several openings. The center hole or *disk hub* allows the spindle of the disk drive motor to grasp and rotate the diskette inside the jacket at high speed. A diskette should be replaced when the edge of the hole is cracked or torn.

The *access slot* in the jacket (shown in *Details of a Diskette* Figure) allows the



read-write head of the disk drive to come in contact with the diskette and to read or write information on the surface of the disk.

The ***index hole*** on the diskette marks the position of the first sector. A sensor in the drive detects the index hole as it passes by the corresponding jacket hole. Recall that a hard sectored disk has maybe 20 or 32 sector holes in addition to the index hole. A soft sectored disk has only one index hole. The hole is normally on the inside of the disk, except for Memorex disks, where the outer part of the disk is used.

The ***write protect*** or ***write enable*** notch is optional. This notch may be used to prevent accidental writing of information on the disk. A write protect or write enable notch allows the user to protect valuable programs or data from inadvertent writing. With an 8-inch floppy, the diskette is write-protected when the notch is exposed, i.e., no information may then be written on the disk. If the notch is covered with a small aluminized square, data may be freely written on the disk. In the case of a mini-floppy, this convention is reversed. Information on the disk is protected when the notch is covered; otherwise, it is not protected. Diskettes are sold either with or without a protection notch. This feature must be specified at the time of purchase.

Alignment/strain relief notches are used to position the diskette correctly. They normally face towards the rear of the disk unit.

Having learned the various types of diskettes, how data is recorded, and the purpose of the various openings in the jacket, let us now learn how to handle a diskette properly.

Handling the Diskette

Proper diskette handling is essential to the reliable operation of your system. Improper diskette handling probably causes most "computer problems." Improper handling "pollutes" the diskette by damaging a few bits (or more) of information. The damage may only be detected much later, thus causing the time-bomb effect for the same user or a subsequent one.

Once you understand the nature of your diskette and are aware of the main dangers, proper diskette handling is quite simple. Most importantly, you must respect the physical and magnetic integrity of your diskette.

Remember the four main characteristics of a diskette:

- it is fragile.
- The data is recorded on a magnetic surface, which is sensitive to electromagnetic fields.
- The magnetic surface is exposed to the environment through the openings in the jacket.
- There is only one correct way to insert a diskette.

Let us examine the rules resulting from these characteristics:

- Respect the physical integrity of a diskette.
- Don't bend or fold a diskette.
- Don't touch the surface of a diskette. The oily chemicals secreted by the skin of your fingers will permanently damage an area of a diskette.
- Keep all sources of magnetic fields away from diskettes, including magnets as well as magnetized objects.
- Maintain the proper working environment. Avoid heat, moisture and dust.

• Insert the diskette into the drive properly.

It is unfortunate that many computer users do not believe in taking strict precautions because they see no immediate ill effects. Because damage generally occurs to only a very small area of the diskette, the diskette might be used for a long time with no visible effect. It is only when data is read or written to or from the damaged area that strange problems start to occur. Because the data stored at the damaged area is modified, the system might start behaving in a strange way that is not directly traceable to a bad diskette. Hence, the strange behavior may be attributed to bad hardware or software, thereby eluding easy detection. It is therefore imperative to insist on proper diskette handling by *all* users.

Now that we know how to handle a diskette properly, we are ready to use it.

Using the Diskette

When using a diskette, four essential recommendations apply:

1. Protect each new diskette.
2. Insert the diskette correctly.
3. Follow a proper power-up/power-down procedure.
4. Inspect diskettes each time they are used.

Let us examine these recommendations.

Protect Each New Diskette

Each diskette is normally contained in a paper envelope. When you first receive a diskette, immediately inspect the envelope for signs of obvious damage. Remove the diskette from the envelope and inspect it for damage. A diskette that has been physically damaged should be presumed to be bad and must be rejected. Don't touch the magnetic surface of a diskette with your fingers or any sharp object.

Remember: if the diskette contains a new program that you have just received, your first reflex should be to make a copy of the diskette and to file the original away in a safe location. Work with the copy that you have created. No exceptions. No excuses.

If you ever wipe out the only copy of a new program that you have just received, you will be convinced that this recommendation is correct. Unfortunately, by that time, it will be too late. This is one area where bitter experience should not be required.

If you are not yet familiar with diskettes, set the write-protect mode on your diskette, by either peeling off or sticking on the aluminum square on the notch (depending on the diskette size), if your diskette has this feature. Use a blank diskette for writing information rather than the one that contains the program. Using the write-protect mode will prevent erroneous writing or erasure of information on your program diskette—provided you insert it correctly.

Now insert the diskette by applying the "rule of thumb."

Insert The Diskette Correctly

Hold the diskette in your right hand between your thumb and index finger, placing your thumb on top of the square diskette label. Open the door of your disk drive and insert the diskette, slowly and firmly until you hear a "click." Then close the door of your drive (if it has one). In most cases, disk drives are designed so that you will correctly insert the diskette automatically if you follow the "rule of thumb," i.e., if, when you hold it, your thumb is pressing against the diskette's label.

When a disk drive is mounted vertically, it is usually on the right side of the screen or the computer, and the diskette label usually faces to the left. When the disk drive is mounted horizontally, the diskette label normally faces up. The longitudinal head access slot is normally inserted first, in the direction of the drive.

If you insert the diskette the wrong way, damage to the data stored on the diskette may result.

There are eight different ways to insert a diskette, but there is only one correct way. Any other way might damage it. If unskilled operators will be using your diskettes, it may be a good idea to print labels that display a large arrow and to place an arrow on each disk jacket indicating the proper way to insert the diskette. This will help to reduce errors when the diskette is inserted into the disk drive.

To remove the diskette, open the door of the disk drive, pull the diskette out, and put it back into its envelope immediately. Then, place the diskette on a horizontal surface *away from the computer* or other electromagnetic equipment or put it in its proper holder or container. (These holders will be described later in this chapter).

Power-up/Power-Down

As a general rule, never insert a diskette into a disk drive until power to the entire computer system has been turned on. If the computer can be turned on separately from the disk drive, it might accidentally write random data on the diskette. In systems where the disk drive is powered directly from the main computer, a diskette may generally be inserted in the disk drive before the system is powered up. If in doubt, don't insert a diskette until power has been turned on.

Conversely, always remove the diskette prior to turning the system off. If the system is turned off while the diskette is still in the disk drive, random data might accidentally be written onto the diskette, thus wiping out some of its contents.

Inspect Your Diskette

Periodically inspect the round hole at the center of the diskette. This hole contacts with the hub that presses on the diskette and rotates it at high speed inside its jacket. Over time, this hole will deteriorate. Most of the damage occurs because of improper insertion. Most microcomputer disk drives simultaneously apply the read/write head and the hub to the diskette so that the diskette positions itself with the hub already through the hole. As a result indentations may appear. Once this hole is damaged, the diskette should be replaced.

Also, examine the surface of the diskette that is visible through the head access hole. Over time, shiny rings will appear. However, scratches, folds, or very shiny wide rings indicate trouble. When these signs appear, test your diskette with a special program, or simply discard it.

Backing-Up

One of the most important defensive measures when using diskettes is to frequently make a backup copy of the information stored on the diskette. Always assume that at some point the data contained on the diskette will be damaged, either by yourself or by someone else. Therefore, as soon as any significant change is made on the diskette, a copy should be created and stored at a safe location.

When backing-up a diskette, it is recommended that you store the copy at a different location than the location where the original is being stored. The reason is quite simple. An undisciplined user is likely to pollute the original diskette and then pollute the backup diskette if it is readily accessible. To guarantee a reliable backup, the duplicates should be stored far away from the original that they intend to protect. Don't hesitate to create multiple backups but make sure that they are all properly labeled. Always write the date

when the copy was made on the label of the backup diskette. (Remember: use a soft-tip felt pen only—don't use a ballpoint pen or a pencil).

We have now learned how a diskette looks, how it works, how to handle it, and how to insert it. There is still more to learn: how to label it, how to store it, as well as how to maintain a suitable environment. Let us examine these topics.

Labeling

Surprisingly, labeling can be a major source of problems for two reasons:

1. Hidden damage to diskette can be incurred when writing on the label;
2. Insufficient identification may result in misuse, erroneous filing or accidental erasure.

Let us examine these two problems in turn.

Writing On The Label

Remember: when writing on a label on a diskette, never use a hard pencil or ballpoint pen. Pressure exerted on the label can damage the diskette underneath by either deforming the diskette or by pressing dust particles captured by the lining inside the jacket into the magnetic surface of the diskette. When writing on the label, use only a soft felt-tip pen. As a general rule, it is best to write on a separate label and *then* carefully affix that label to the diskette.

Also, don't use an eraser to erase a label. Residue from an eraser will find its way first into the envelope and from there to the magnetic surface of the diskette where it will cause damage.

Identify the Diskette

Whenever you modify the contents of a diskette, identify it properly. In time many copies of a file are created. Unless they are properly identified, much aggravation can result from using or destroying the *wrong* version. Immediately after use, always label each diskette with at least the following information.

1. The name of the file
2. The date

In addition, it is desirable to keep with the diskette a printout of its directory, i.e., the complete list of the files it contains. Generate this printout on the printer, then tape it to the envelope in which the diskette is kept.

Whenever possible, name files in such a way that successive versions can be identified. Start with LIST1, then call the second version LIST2, the third LIST3, etc. As long as you know what the latest version is, this works.

Beware of situations where several files are updated on the same diskette. You may no longer know which file was changed when. In such a case, create a separate backup copy of each file that was changed, or else carefully list each file along with the date it was last modified.

When a diskette is a master or a copy, identify it as such. Masters are normally kept in a separate location and handled with great care. Backup copies are also generally stored in a separate location.

Dispose of obsolete copies after a reasonable period of time, or else:

1. You will quickly accumulate dozens of useless diskettes.
2. You may encourage errors by keeping old versions around.

Storing Diskettes

Both physical and environmental factors should be considered when storing diskettes. Diskettes can either be stored horizontally or vertically, but they should not be stored in such a way that they will sag, slump, or be compressed. They should be protected from adverse magnetic or environmental conditions. Let us now examine the do's and don'ts for storing diskettes.

DON'T Let Them Lie Around

When not in use, a diskette should be stored in a protective envelope and preferably filed away. Leaving a diskette lying flat and unprotected on the top of your computer is an open invitation to disaster. Dust will accumulate on the diskette. Usually, no immediate effect will occur as the dust particles will be captured by the inner lining of the diskette. However, once more dust has accumulated, or pressure is applied to the lining of the disk jacket, one or more specks of dust will scratch the disk surface and damage data. Later on, when the data is used, because it is damaged, it will cause erratic system behavior and there will be no easy explanation for this behavior. Again, this is the time bomb effect.

DO Store Them Properly

When stored, diskettes should not be bent or stressed in any way. They may be placed in a box as long as there are no physical obstructions inside the box that might exert pressure on them. Don't overcrowd diskettes in a single container.

When storing diskettes horizontally, don't stack more than 10 diskettes on top of each other. Diskettes should not be compressed.

Diskettes may also be stored in vertical plastic holders. The advantage of plastic holders compared to metal ones is the guarantee that plastic holders are not or will not become magnetized. Such holders range in style from rotating diskette holders to plastic boxes and vertical rack holders.

Using plastic will help prevent a magnetized metal element from coming in close proximity to the diskette, but it will not eliminate the danger altogether. In other words, a diskette lying in a plastic file holder may be wiped out if a magnetic coil or a magnetized screwdriver is placed near it. Therefore, the file holders themselves should be located away from sources of electromagnetic interference.

Hanging file holders may be placed in metal cabinets. Metal cabinets will, to some extent, shield the contents of a diskette from electromagnetic radiation. Naturally, this is true only if the metal cabinet is not magnetized.

Environment

Diskettes must be used in a proper environment. Here are the main enemies of your diskette:

- temperature extremes
- dust
- liquids and vapors
- electromagnetic interference

Let us examine each of these constraints in turn.

Temperature

Diskettes should be kept away from direct sunlight and extreme temperatures. Typically, diskettes will operate only between 10° and 50° Celsius (50° to 122° Fahrenheit). They will accept a relative humidity of 10% to 80%. If a diskette has been exposed to a temperature below 5°C or over 50°C (41° or 122°F), it should be presumed damaged, and discarded.

Special high-performance diskettes can withstand higher operating and storage temperatures. They may operate from 10° to 70°C (50° to 158°F) and may be stored at temperatures ranging from −40° to 70°C (−40° to 158°F).

Don't use a diskette that has just been brought in from outside the building if there is a singificant difference between the indoor and the outdoor temperatures. Allow a period of 24 hours for the temper-

ature of the diskette to equaiize with the temperature of the computer room.

Dust

Dust is one of the greatest enemies of diskettes. Dust may be due to an unclean environment or to more subtle causes such as heavy smoking, machinery (for example, drills used in dentistry), or specks of paper from a high speed printer. Ali sources of dust should be removed from the vicinity of disk drives.

Smoke in the air will also deposit particles on the surface of a diskette. This will cause the head to scratch the disk surface, thereby damaging the diskette.

Liquids

Liquids will damage the surface of a diskette. Don't use or even keep a diskette that has come in contact with a liquid. Discard it; it is unusable even after the liquid has dried. The residue will contaminate the diskette. The best precaution is to ban all liquids from the computer room. Whenever this is not practical, care should be taken not to spill liquids on diskettes or on diskette jackets or envelopes.

Vapors

Avoid placing solvents close to diskettes as chemical fumes may affect the magnetic coating of a diskette. Dangerous fumes encountered in office environments include fluids for duplicating machines, nail polish, and some adhesives.

Electrical and Electromagnetic Interference

Electromagnetic interference (EMi) is the name given to electromagnetic radiations that interfere with recorded data. Data can be destroyed or even wiped out entirely if a strong electromagnetic field or electrostatic field is applied to a diskette. Strong electromagnetic radiations are emitted by transformers and coils. A diskette should never be placed in ciose proximity to a magnetic coil (such as those used in telephones) or a degaussing coil (such as those around a color television tube).

Remember: don't put your telephone on top of a diskette, a box of diskettes, or even the disk drive. If the telephone rings while on top of a diskette or disk drive, it will wipe out any diskettes underneath it. (if you have any doubts, try it on an old diskette). Keep the telephone cord short enough so that the telephone can never be inadvertently placed on top of disk drives or a work table where diskettes might be lying.

Any metal object should be suspected of being magnetized. In particular, screwdrivers and paper clips tend to become magnetized over a period of time. A magnetized screwdriver placed in ciose proximity to a diskette can damage the data. Similarly, car keys and other metallic objects may become sufficiently magnetized to affect a diskette. Always store diskettes in a proper container away from electromagnetic radiation.

Diskettes must aiso be protected from static. In a dry environment, static electricity can build up. In particular, if a computer room is equipped with wool carpeting, it is possible for up to 15,000 volts of static electricity to build up in the body simply by walking on the carpeting. If a finger is pointed at the computer or a diskette, an electrostatic discharge may occur and a spark will travel between the tip of the finger and the computer or diskette. A spark may also occur if you waik across the room and touch a metai part while holding a diskette. Such a spark is guaranteed to wipe out some of the contents of any diskette, as well as disrupt operation of the computer. To avoid this problem, you can use anti-static mats and sprays. Whenever the danger of static electricity exists (for example, on a dry day), either be careful not to point a finger at the diskettes, or be sure to ground yourself carefully before doing so. You can ground yourseif by touching a metaiiic object connected to the frame of the buiid-ing or by touching a neutral ground.

Transporting Diskettes

Mailing Diskettes

Diskettes are often mailed. When mailing a diskette, use the best possibie packaging that will guarantee the physical integrity of the diskette. Use rigid inserts in the envelope. If you use cardboard, make sure it is the corrugated kind. Place a sheet of it on both sides of the diskette, with the ridges of one sheet perpendicular to the ridges of the other. Don't use ordinary cardboard, such as the back of a paper pad. It is not stiff enough and will bend, which may destroy data on the diskette. Whenever possible, place the diskettes inside the package, ¼" to ½" away from the flat side. Distance is an excellent protection against pressure and magnetic objects.

Traveling with Floppies

Airport X-ray machines will not harm a floppy. However, the coils of the machinery surrounding them are dangerous. It is best to keep diskettes away from these machines.

Preventive Maintenance

Two types of preventive maintenance action are recommended in order to safeguard your diskettes:

1. Keep your disk drive within the prescribed settings.
2. Use defensive procedures to maintain the integrity of your data.

Let us examine these two maintenance procedures in detail.

Maintaining The Drive

Disk drives must be correctly calibrated and aligned, i.e., the drive must be calibrated to the proper tolerance and the heads must be properly aligned. This is best accomplished by a specialist but can be done by a dedicated tinkerer. Special allgnment disks are available from the manufacturer to facilitate this process. Typically, a drive will stay aligned for a year or more.

The disk drive heads should be cleaned regularly to eliminate dust. The frequency of cleaning depends on the environment in which the disks operate and the discipline of the users. As a rule of thumb, disk drive heads should be cleaned at least once a year. Special head-cleaning kits are available for this task. Preferably, solvents such as alcohol, freon or thinners should not be used.

Let's go through the steps involved in cleaning a read/write head using a kit.

Step 1: Saturate the cleaning fabric on the special diskette with the cleaning solution as shown in above.

Step 2: Insert the diskette into the drive.

Step 3: After 30 to 50 seconds remove the diskette and make a note on the diskette that it has been used. Typically, each diskette may be used up to 15 times.

When double-sided diskettes are used, an extra opening may be found on the back of the cleaning diskette than can be helpful when cleaning the opposite side of the head mechanism.

Half of the diskette contains a special cleaning fabric and the other half contains a regular dry fabric that wipes off the read/write head.

Depending on how frequently the diskettes are used, and the cleanliness of the environment, cleaning can take place every few weeks or months. Anti-contamination techniques, such as cleaning, normally have two main positive effects:

1. The read/write heads are kept contamination free.
2. Operators are reminded of the risk posed by dust and other particles to their equipment and will generally become more cautious.

A typical list of disk contaminants includes: dust, other particles, hair, skin flakes, fingerprint oil, and smoke film.

Dual-sided diskettes are much more susceptible to dust than single-sided diskettes. With a single-sided diskette, the ceramic read/write head presses on one side of the diskette while a soft felt backing presses on the other side. Compression of the diskette material is minimal. In the case of a dual-sided diskette, two ceramic read/write heads are applied to the diskette simultaneously, one on each side.

Don't attempt to clean the diskette surface itself. Any contact with the disk surface will contaminate it.

Remember also that disk drives are sensitive mechanical devices. When moving a disk drive, be careful to avoid shocks and vibrations. Such physical disturbances might misallgn the head.

Physical damage to a diskette is inflicted either by the drive or the operator. Diskettes should be frequently inspected for signs of wear or damage. If there is visible wear or damage on the disk surface, the disk should be presumed bad and should no longer be used. A backup should be used instead and the suspected disk should be discarded. Remember, the appearance of large shiny rings may indicate a mechanical problem with the disk drive.

Most diskettes become damaged before they wear out. However, in circumstances where diskettes are valuable and are frequently used, center rings are available and can be used to reinforce the spindle holes of diskettes.

Disk Failures

Diskette failures will seldom occur if proper handling procedures have been followed. If a diskette has been handled properly, and a disk drive failure occurs, improper calibration or alignment should be suspected.

Let us examine disk errors and possible causes.

Disk Errors

Disk errors are due to the accidental change of the value of one or more bits of information at its surface. Such errors are traditionally classified in three main categories:

1. *Drop-Outs.* In this case, bits are wiped out either beacuse of a defect on the disk surface or because of an inadequate write signal generated by the read/write head. Both cases are generally attributable to contamination or to physical damage to the diskette.
2. *Drop-Ins.* In this case, spurious bits are written in locations where they should not be. This is generally due to electromagnetic interference where a strong magnetic field creates spurious information on the surface of the disk. This can also be due to disk drive malfunction or to erroneous software that writes information in a place it is not supposed to.
3. *Bit Shifts.* This problem refers to the physical shifting of bits of information at the surface of the disk. Such shifting results in timing errors that may make the data unreadable. This type of problem is generally caused by electromagnetic interference, but it may also be caused by physical distortion or high temperature.

Most disk errors are detected during the reading process. This happens because the data that was stored on the disk has been damaged ("polluted"). Usually, the data contained in the affected file on the disk has been lost. In any case, the contents of the entire disk should now be suspected, and the polluted diskette should be replaced by the backup.

However, if a failure occurs while writing, three causes should be suspected before accusing the equipment:

1. The write-protect tab may not be properly positioned over the notch (or removed from it, in the case of a minidiskette).
2. There may be a software protection feature in the operating system that prevents unauthorized writing on a given file.
3. You may be using the wrong type of diskette for the disk drive. In particular, a hard sectored disk will not work with a soft sectored disk drive.

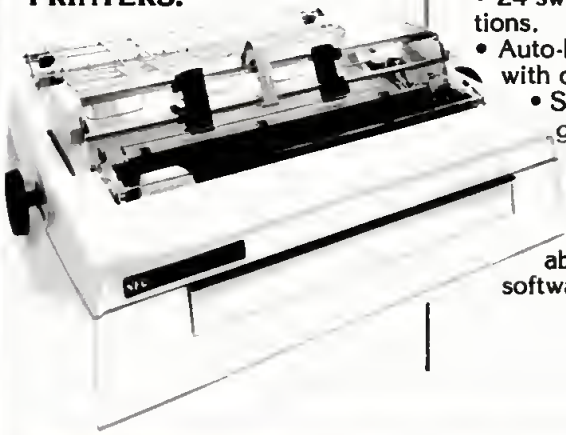
Floppy Disk Summary

Floppy disk failures are the most common cause of failures for small computers. Proper diskette handling requires respect for the physical and magnetic integrity of the diskette. As long as proper handling precautions and proper operating procedures, including a thorough backup procedure, are followed, diskettes will operate reliably for long periods of time.

3 Choose from Intelligent Printers for your IBM Personal Computer

The NEC Spinwriter is an excellent printer. But you need more— More interfacing choices, more RAM buffer, and more word processing features. So we installed a specially designed interface and renamed the printer SELLUM I. For the past 2 years it's been outselling all expectations.

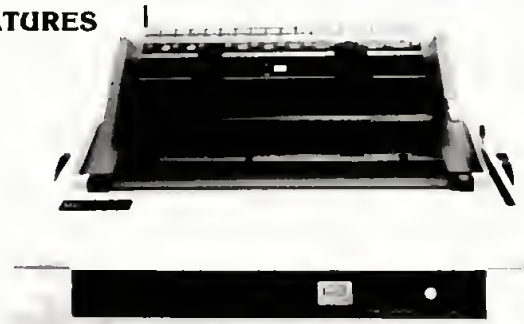
Now you have 3 choices of printers based on the NEC Spinwriter Series, and the Fujitsu. All perform beautifully with the IBM Personal Computer. They're the **SELLUM SERIES PRINTERS.**



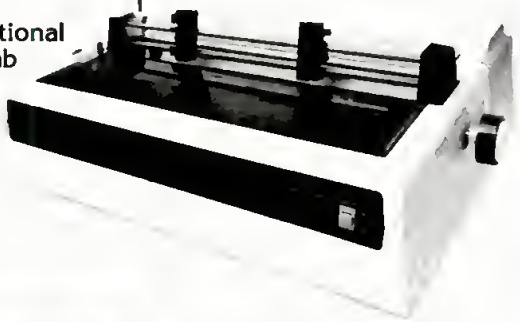
OUTSTANDING FEATURES

Select from either of these fine printers, and enjoy many bonus benefits, such as

- 16K RAM or 48K RAM option.
- 16 baud from, 50-19,200,—hardware/software selectable.
- RS-232, Centronics Parallel, IEEE ports, Current Loop.
- Switch selectable protocols: NEC 3510, Diablo 630, Qume Sprint 9.
- 24 switch selectable functions.
- Auto-bidirectional printing with optimized throughput.
- Sheetfeeder and graphics modes.
- Auto proportional spacing and tab setting.
- Upgradable to latest software.



- Complete word processing features, standard.
- Supports optional front panel.



MATCH THE RIGHT PRINTER TO YOUR NEEDS.			
Features	Sellum N-35	Sellum N-77	Sellum F-86
Speed	33 cps	55 cps	80 cps
Shannon Test	28 cps	48 cps	72 cps
Print Wheels	128 char.	128 char.	127 char. plastic 96 char. metal
Noise Level	60 db	60 db	60 db
Suggested Retail	$2495	$3295	$3495

Sellum Series Printers also available for most microcomputers. Sold only through dealers and systems integrators.

Extended 180 day warranty available.

INTERSELL

465 Fairchild Dr., #214
Mountain View, CA 94043
(415) 964-5460

PC Directory

CONSULTANTS

CALIFORNIA

COMPUCON, INC.
Offering Value added management needs analysis, Systems analysis/Custom programming, Computer software and hardware selection assistance mini/micro/mainframe "Computers don't save $, they make it."
2083 Landinga Driva, Mountain View, CA 94043 (415) 961-0234.

THE PROGRAMMING SHOP
Worried about making your IBM Personal Computer really personal? The Programming Shop recognizes that you have unique business application requirements. Our consultation and programming services are available to support. Networking, Distributed processing, Accounting, Structured application development. For more information, give us a call today.
1164 Umbarger Road, San Jose, CA 95121 (408) 226-2157.

STANDARD SYSTEMS
Professional Consulting Services for your Personal Computer. Custom designed business applications. System design and implementation. Telecommunications consultant and training.
STANDARD SYSTEMS 505 Channing Avenue Palo Alto CA 94301 (415) 327-4718.

GEORGIA

JAMES B. STEINER, CDP
Steiner Consulting, Inc.
Over 20 years DP industry experience. Management Consulting, Project Management, Systems Design, and Programming. For a copy of "Checklist of Points for First Time Computer Purchasers to Consider and Evaluate" send $1 and a self-addressed, stamped business envelope to
Dept PCCK, 2596 DeFoora Ferry Road NW, Atlanta, GA 30317 (404) 351-5122.

MASSACHUSETTS

JOHN J. SPRINGFIELD
Independent computer consultant providing custom programming for IBM Personal Computer, Apple, Zenith and IBM mainframes (CICS). IBM Personal Computer available for in-house demonstration and training.
37 Parker Street, Newton Centre, MA 02159 (617) 969-5183.

MISSOURI

BUSINESS PROBLEM SOLVERS
Warren P. Henry, CDP
Established professional with quality references. Custom programming and packaged software ranging from thoroughbred handicapping to manufacturing inventory control.
250 Richards Road, Room 245, Kansas City, MO 64116 (816) 471-8660.

NEW JERSEY

TRENDTECH CORPORATION
Consulting services for small businesses including Micro-Computer selection, software recommendations, feasibility studies, custom software design, and programming. IBM PC available for demos in 1st quarter '82.
William Letendre, Wayne, New Jersey 07474 (201) 694-8622.

NEW MEXICO

LIGHT SOFTWARE
Need Help? We'll take on your project with our new PC, our 14 years of experience on IBM computers, and our backgrounds in scientific, statistical and systems programming.
Clint Davis and Marilyn Davis, Ph.D.
Box 4982 Santa Fe, NM 87502
(505) 982-4049

SOFTWARE

SOFTWARE MARKETING.
We are ready to distribute your software to our already existing customers and computer dealers. Send description of program with details. Evaluation copy preferred.
CORNERSTONE SOFTWARE, P.O. Box 5151, San Jose, CA 95150.

FINANCIAL, INVENTORY AND COST ACCOUNTING
"It takes more effort to make it simple."
SIMPLE STRUCTURE SYSTEMS, INC. 7114 Newthorn Avenue, Hollywood, CA 90046.

INVENTORY CONTROL SYSTEM.
PERFORMS: Order entry/point of sale, Purchasing with Reorder Point, Receiving. INCLUDES: 1000 Inventory items, 100 Vendors, Listings and more. COST: $349 Complete. REQUIRES: 1 disk, 48k and Printer. Dealer inquiries invited.
OP SOFTWARE ASSOCIATES, 8459 NE 3rd Street, Coral Springs, FL 33065 (305) 753-5893

KELLER SOFTWARE
Announcing NAL9000 Series, a new line of engineering, business and statistical software for the new IBM Personal Computer. Send for our brochure and price list.
KELLER SOFTWARE, 1825 Westcliff Drive, Newport Beach, CA 92660.

FORTH FOR IBM PERSONAL COMPUTERS
Complete program development systems including interpreter/compiler with virtual memory management, custom screen editor, line editor, assembler, decompiler, and many utilities. Floating point math extensions, cross compilers, and other options also available.
LABORATORY MICROSYSTEMS, 4147 Beethoven Street, Los Angeles, CA 90066 (213) 390-9292.

FULL SCREEN TEXT EDITOR.
Full screen text editor for IBM Personal Computer. Write for information.
ACORN SOFTWARE, INC. P.O. Box 8715, Coral Springs, FL 33065.

PERSONAL MONEY MANAGER.
Available for the IBM Personal Computer. Software designed to be user friendly. Features include: Monthly financial planning, Balance sheets in minutes, Profit and Loss statement at your fingertips. Documentation written in English, and much much more. Write today and find out how the PERSONAL MONEY MANAGER can help save you time and money.
THE PROGRAMMING SHOP, 1164 Umbarger Road, San Jose, CA 95121.

PLAINWRITER.
Fast, easy to use word processing software written specifically for the PC and for simplicity of use. Useful for correspondence, manuscripts, proposals, legal documents, creative and journalistic writing. Also useful as fast, flexible full-screen line editor for program development. Fully compatible with all DOS utilities and programs. Faster and simpler than EASYWRITER and EDLIN.

Features include rapid fast editing, help menus, function keys, abbreviations, automatic centering, alignment, justifying and paging, block move and copy, global search and replace. Requires DOS, 64K, and any PC compatible printer.

Special introductory offer: $125. 30-day money back guarantee. Demonstration diskette $15, applicable to purchase. Available March.
LIFETREE SOFTWARE, 177 Webster Street, Suite 342, Monterey, CA 93940 (408) 659-3221.

RATES AND INFORMATION

If you have products or services to offer owners of the new IBM Personal Computer, the *PC Directories* provide an economical, rifle-shot way to reach your prospects.

Service and software listings are classified according to type. Consultants and retailers are classified geographically, with subgroups by specialty where warranted. All listings appear in a standard format, typeset by *PC* from the information you provide, and are published in the first available issue after receipt.

- *CONSULTANTS:* Individual name, company name, mailing address, phone and computer network numbers (one of each), and up to 35 words describing your consulting credentials and specialties.
- *RETAILERS:* Store name, individual's name & title, mailing address, phone and computer network numbers (one of each), store hours, and up to 35 words describing your products and services.
- *SERVICES:* Service type, company name, mailing address, phone and computer network numbers (one of each), and up to 35 words describing your service.
- *SOFTWARE:* Product name, author name, company name, mailing address, phone and computer network numbers (one of each), and up to 35 words describing your product.

RATES: Listings described above are $50 each; additional words of description section are $10 for each 15 words or fraction. Charges are payable in advance. For listings in three or more consecutive issues, paid in advance, 15% discount.

ORDERING: Use our convenient tear-out order card, or mail your listing information with payment to *PC Directory*, 1239 21st Avenue, San Francisco, California 94122.

DEALERS

ALABAMA

COMPUTERLAND OF BIRMINGHAM
215 West Valley Avenue,
Birmingham, AL 35209
Source Number: CL0034
Store Hours:
Monday–Friday 10 am–6pm
Saturday 10 am–4 pm

CALIFORNIA

COMPUTERLAND OF ALMADEN
5035 Almaden Expressway
San Jose, CA 95118
(408) 267-2182
Hours:
10:00 to 7:00 Weekdays
10:00 to 6:00 Saturday
Specializing in service and support to the IBM South San Jose facility employees. Hard disks, add-on memory, software and peripherals in stock. Call for information regarding IBM Personal Computer training seminars.

OTHER SERVICES

WORD PROCESSING INTERFACE TO TYPESETTING

Your word processed manuals or books are loaded directly into our typesetter. Eliminate retyping. You need telecommunications option. We can design and offer complete printing facilities. Suitable for documents over 300 pages.
GEORGE GRAPHICS Attn: Lan Shafer
650 Second Street, San Francisco, CA 94107 (415) 397-2400.

Win an IBM* Personal Computer From PC...

and get your PC subscription at the same time.

Announcing the PC "PC" Giveaway

The easiest way in the world to get an IBM Personal Computer?—win our "PC" drawing on March 1, 1982. The prize includes a system unit (16k) with keyboard and color/graphics monitor adaptor.

You don't have to subscribe to PC to win our drawing. All you have to do is fill out the attached card and send it in before March 1. Complete drawing rules are outlined below.

Subscribing is the best way to ensure that you'll read every informative issue of PC while saving 33% off the single issue price. And whether or not you win our "PC" drawing, the chances are you'll want to keep abreast of developments with the IBM Personal Computer.

PC Magazine provides all the important inside information you'll need to make the best possible use of your IBM "PC". Product reviews, applications, articles, commentaries from other users and interviews with people who are at the center of the industry—all available in the pages of PC, and all designed to help you evaluate, expand and apply the IBM Personal Computer to your needs. Timely, readable, and accurate information—that's what you get as a PC subscriber—and it's not available anywhere else.

Giveaway Rules

Mail entries postpaid to PC Magazine at 1239 21st Avenue, San Francisco 94122. Entries must be postmarked before midnight, March 1, 1982. Drawing will be held and the winner notified by April 1, 1982. Prize delivery date will be subject to IBM product availabilities.

Entries must be on an official entry form or its exact copy. You may enter as often as you like, but each entry must be mailed in a separate envelope.

Employees of Software Communications, Inc, its affiliates, dealers, distributors, advertising agencies and media are not eligible to win. This offer is void where prohibited, taxed or restricted by law.

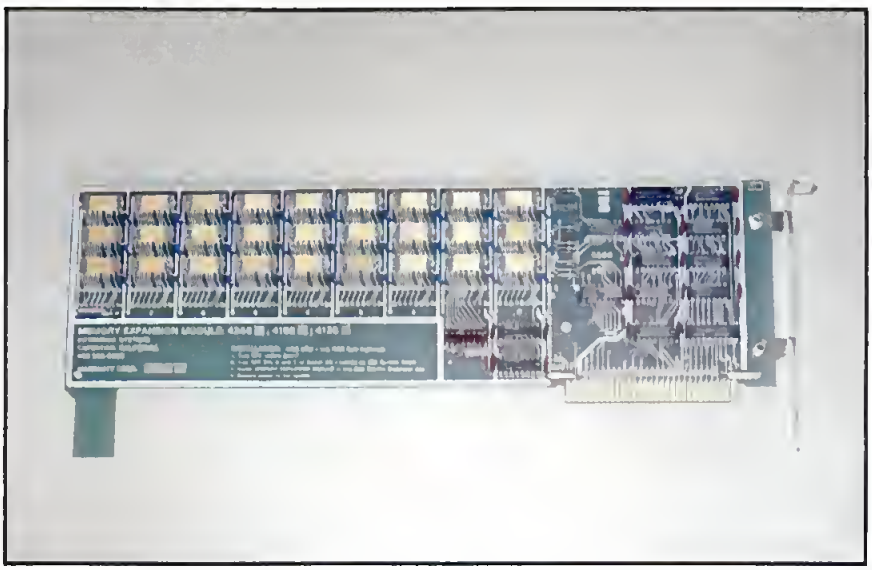
Don't delay. Use one of the attached cards to send in your subscription today.

*IBM is a registered trademark of International Business Machines. PC is an independent journal, not in any way affiliated with IBM.

MEMORY MAXIMIZER

Expand your PC's memory to 256K with 1 slot for $1,095.

Jeremy Joan Hewes



INTERMEDIA SYSTEMS OF CUPERTINO, California has begun production of their model 4192 Memory Expansion Module, which provides 196,608 characters (192K) of read-write memory (RAM) for the IBM Personal Computer. When installed, this added memory brings the computer to its announced capacity of 256K. The board is designed specifically for use in the PC and can be installed in any available expansion slot except that used for the disk controller. The manufacturer says PC owners can purchase the new product at ComputerLand stores for $1,095.

One advantage of this single-board memory unit, Intermedia says, is that it has economical space and power requirements for the PC. It makes relatively little demand on the computer's power supply, and users get the memory equivalent of three 64K expansion boards in one slot. Considering that there are only five such slots in the PC, this concentration of memory could be highly beneficial to anyone who wants to take full advantage of the options available for the computer.

For example, one of the slots is occupied by a disk controller (unless the PC uses a cassette only, an unlikely possibility); a second is used by the board that controls both the printer and the monochrome display; if a color monitor is used, the printer and color monitor require separate boards, filling separate slots; the communications card occupies one slot; and a game paddle takes up one more slot. Thus, with any assortment of options, the PC could not accommodate three individual 64K memory expansions to bring it to the 256K potential without an auxiliary chassis as well.

The price comparison of three 64K boards or one 192K unit is likewise favorable. The cost of three IBM expansion boards with 64K each totals $1,620; at $1,095, the single memory expansion board costs 32 percent less. These prices are also indicative of how rapidly this technology and its costs have changed: little more than two years ago a 64K memory board sold for as much as $1,000, and five years ago that much memory cost $1,500 and occupied as much space as all the boards in the PC.

At present, the software that can utilize this added memory is limited, but many of the major program publishers are reported to be adapting or developing software that will take advantage of the PC's larger memory capacity. One currently available product that is able to use more than the standard 64K in the computer is Microsoft's Pascal. The advanced disk BASIC sold with the computer also can utilize more than the 64K memory at present. In addition, IBM announced in early December that a Fortran compiler will be available in March and a macroassembler will be ready in February of this year; both are being developed by Microsoft and will be able to use the added memory. Personal Software has announced an upgrade of its *VisiCalc* program that will use up to 214K for a spreadsheet, and says it will provide the upgrade free to purchasers of the earlier version.

Tom Kornei and Harry Kline, developers of the Intermedia Systems board, emphasize the quality of their product and their solid experience in the electronics field. Both men have advanced engineering degrees from the University of California at Berkeley, both are former Hewlett-Packard employees, and their independent company has been in business for ten years. They design and manufacture a variety of electronics products, most of which are supplied to the Medical Electronics Division of Hewlett-Packard.

Their new product is simple to install and soundly made, and the firm offers a one-year warranty on the board. The unit is built with industry-standard 64K dynamic RAM chips, has a stainless steel mounting bracket and a fiberglass "foot" for secure placement, and is supplied with the cardholder needed to hold it in place in the computer's cabinet. Special packaging was designed for shipping the board; it consists of a large wrapping of convoluted foam inside a sturdy cardboard box. Each board is tested by being "cooked" for ten hours at 50 degrees Centigrade before it is shipped to a dealer.

Although other manufacturers have announced their intention to market similar memory expansion boards, Intermedia Systems asserts it is the first to have such a product in distribution. See *New Products* section for related announcements.

Intermedia Systems, 10601 S. Saratoga-Sunnyvale Rd., Cupertino, California 95014, (408) 996-0900

"WITH THE UCSD p-SYSTEM,™ WE CAN WRITE ONE APPLICATION THAT GOES FROM APPLE TO ZENITH."

HARRY BLAKESLEE, President, Denver Software

Our business is bigger and better than ever.

A lot of the credit for that goes to the UCSD p-System software from SofTech Microsystems. It's given us ten times the market we used to have.

We can write a single, sophisticated applications program with the UCSD p-System—like our financial management package—and it just keeps on running. On Apple, Commodore, Ohio Scientific, Texas Instruments, Zenith, IBM, and more. That's the real beauty of the UCSD p-System. Any program you write for one microcomputer runs on others, both today and tomorrow. You protect your software investment, without restricting your hardware options.

And with the UCSD p-System, you can use the language of your choice—UCSD Pascal,™ FORTRAN-77, BASIC, or assembly language. All are backed by SofTech Microsystems, a leading system software company who's been around for over a decade, who knows how to develop professional quality software, and who's committed to delivering it.

Get a head start on tomorrow. With the microcomputer software that goes from "A" to "Z." Distribution licensing and single copies available. Write or call for details, so you can start going places, too.

SOFTECH MICROSYSTEMS
A SUBSIDIARY OF SOFTECH

For the software that's going places.

9494 Black Mountain Road, San Diego, CA 92126. (714) 578-6105
TWX: 910-335-1594

UCSD p-System and UCSD Pascal are trademarks of the Regents of the University of California.

Product Report

Visi-1040

Tax planning models for spreadsheet programs.

TAX SEASON IS HERE AGAIN, AND WHILE *PC* doesn't have any tips on reducing your share of the national debt, we do have news of something that will make filling out the forms a lot less painful.

That something is the Tax Planning Model, from Pansophics, Ltd. Designed to work on an IBM PC with either VisiCalc or SuperCalc, the Tax Planning Model is actually four spread-sheet files, each of which contains a format for filling out one of the following tax forms:

- Unmarried, single 1040 return
- Unmarried, head-of-house 1040 return
- Married, joint 1040 return
- Married, separate 1040 return

These models are included in the "personal package" and retail for $100. There is also a "professional" package selling for $150, which in addition to the above contains two additional files:

- Corporation, 1120 return
- Partnership, 1065 return

Jay Carlson

The most apparent advantage of this method of figuring income tax is that all the calculations and lookups are performed automatically. If you want to know what your tax situation would be like if you had received that raise last October, you can easily enter a different number in the income earned column and press the exclamation key (!) for manual recalculate (VisiCalc version). Presto, like magic the numbers change before your very eyes. Ouch, it's a good thing you didn't get that raise after all.

In testing the single 1040 return model, using bogus figures for income and deductions, *PC* discovered that it only takes about 10 minutes using these tax models to figure your taxes. And that's for a novice, non-CPA type person. With practice, we calculate that you could figure 80 to 100 returns in a single day using the Tax Planning Model.

The best part is once you've filled in the numbers for your return, you can slip an actual 1040 form in your printer and then print it out. Every number will appear in the correct position on the form.

The tax models have been geared to the 1981 return so that the new combined dividend and interest deduction is figured in as well as 1981's special 20% capital gains maximum tax.

—David Bunnell

VisiCalc Tax Planning Models
Pansophics, Ltd., Whistlestop Mall, PO Box 59, Rockport, Massachusetts 01966, (617) 546-3104

HOW TO BE AN INFORMED BUYER

Legal considerations when you buy a computer.

K. Stewart Evans, Jr.

THE FACTS OF THE CASE: John Doe Buyer thought he had purchased the top-of-the-line, state-of-the-art personal computing system just right for his business when he signed the written purchase contract. Later, when the computer system failed and could not be repaired, despite repeated attempts, Buyer discovered that the promises and assurances of quality were meaningless. So Buyer sued the manufacturer of the computer system to recover the purchase price, repair expenses, and lost profits.

THE RULING: Upon evaluating the contract Buyer had signed, the court ruled that all warranties had been excluded.

THE RESULT: Buyer was left with a computer that did not work, and he was required to pay the full contract price for the system.

THE MORAL OF THIS STORY IS NOT THAT our courts are unfair, unjust, or manufacturer-oriented. Rather, the moral is that no buyer should enter into a contract for the lease or purchase of a computer system armed with only half of the requisite knowledge. Knowing computer technology and your particular requirements for its use is not enough. To avoid Buyer's predicament, it is essential to either learn the relevant principles of law or have a legal expert review the terms of the agreement before it is made final.

This article will introduce you to the legal knowledge that could have saved Buyer from his costly mistake. The general principles of this law, the Uniform Commercial Code, apply in most states, but you would be wise to learn the specific rules of your state and to seek the advice of an attorney if you have any questions about a purchase agreement.

K. Stewart Evans, Jr. is a partner in the law firm of Boothe, Prichard & Dudley, with offices in Fairfax and Alexandria, Virginia. His specialty is commercial litigation, and his work includes computer-related matters.

Promises, Promises

The primary legal obligations that arise between a buyer and a seller relating to the quality of the goods purchased are known as warranties. A warranty is a promise or assurance by the seller that the goods will conform to certain specifications regarding quality, performance, or durability. Warranties fall into two main categories: express warranties, which are assurances actually made by the seller to the buyer; and implied warranties, which are created by law.

EXPRESS WARRANTIES. An express warranty is created by the seller in any of three ways: (1) an affirmation of fact or promise; (2) any description of the goods; or (3) any sample or model that is made part of the "basis of the bargain" (that is, the ingredients influencing the buyer's decision to buy). The law does not require that sellers use formal words such as "warrant" or "guarantee," or that theyhave a specific intention to make a warranty. Therefore, advertisements, brochures, pamphlets, sales talk, and demonstrations used to "show off" the features of a computer system may actually amount to express warranties by the seller.

The seller's affirmation of the value of goods or any opinion or commendation of the goods is not a warranty. For example, if the seller asserts that one computer is the "best computer ever made," this statement is not an express warranty. Equally important, if the seller makes promises after the buyer has decided to purchase the computer, these are not express warranties, because they are not a part of the basis of the bargain.

IMPLIED WARRANTIES. Unless excluded or modified by a seller, a warranty of merchantability is implied in any agreement for the sale of computers between a buyer and a seller, as defined by the Uniform Commercial Code (UCC), which applies in all states but Louisiana. To satisfy this warranty, the goods must at least pass without objection in the trade under the contract description and be fit for the ordinary purposes for which such goods are used. A refrigerator that will not cool, a heater that will not heat, or a computer that will not perform the storage, retrieval, and data processing functions computers ordinarily perform are examples of goods that are not merchantable.

Another type of implied warranty—of fitness for a particular purpose—may be created when a computer system is purchased. This warranty applies when the seller has reason to know the buyer's particular purpose in purchasing the computer; the buyer relies on the seller to select and furnish the right computer; and the seller is aware that the buyer is relying on his or her skill or judgment in the matter.

When Is a Warranty Not a Warranty?

Considering the express warranties that can be created by every advertisement, promise, or assurance made by a seller, and the implied warranties created by law when a buyer purchases goods from a seller, how is it that our Mr. Buyer found himself with a computer that did not work and no legal remedy? Simple. Buyer voluntarily agreed to eliminate virtually every warranty and legal right to enforce those warranties which the law creates. How? When he purchased the computer system, Buyer signed a written contract that included the following language:

"Seller agrees to exchange any parts shown to have become defective from normal wear and use during the first six months from date of delivery. Purchaser expressly waives all damages, whether direct, incidental or consequential. There are no understandings, agreements, representations or warranties, express or implied (including any regarding merchantability or fitness for a particular purpose) not specified herein, respecting this contract or the equipment hereunder. This

Illustration by Linda Nace

contract states the entire obligation of seller in connection with this transaction.''

Buyer ran into a trio of weapons that sellers of goods use to protect themselves from the legal obligations that arise from warranties: disclaimers of warranties; limitation of damages; and limitation of remedies. If you encounter anything resembling this language in a purchase agreement, do not sign it; take the document to a lawyer and have him or her supply alternative wording that protects you.

DISCLAIMERS. The function of a disclaimer is to limit or exclude standards of quality, performance, and durability from a contract or agreement. While the effectiveness of a disclaimer can be a difficult legal question, all purchasers of computers should be extremely wary of any such provisions. To disclaim or exclude the implied warranty of merchantability, language which uses the term ''merchantability'' is required, and, in the case of a written contract, that language must be conspicuous. A disclaimer or limitation of implied warranties of fitness must be in writing and conspicuous. But expressions such as ''as is'' or ''with all faults'' are effective to exclude implied warranties of merchantability and of fitness for a particular purpose.

LIMITATION OF REMEDIES. Remedies available under the UCC for breach of warranty may be limited by agreement between the buyer and seller. The following example of a limitation of remedies clause limits the buyer to receiving replacements for defective equipment: ''Damaged or defective equipment will be replaced without cost by the seller. Except for such replacement, buyer receives no other warranty.'' Using similar clauses, the seller can limit his or her legal obligation to the buyer. It is not clear whether current law prohibits the limitation of remedies when a written warranty is given for consumer goods.

LIMITATION OF DAMAGES. Current law does not prohibit limitations of damages in consumer product contracts. Therefore, language such as ''Seller is not liable for any damage to business, property or reputation resulting from any defect or malfunction in the computer equipment'' is an acceptable method for the seller to limit his or her liability. With this clause in a contract, the seller would not be liable for damage such as property damage resulting from an electrical short, loss of data, or delay in turning out projects, bills, or other information. Language that attempts to limit the seller's liability for personal injury resulting from a defect in the goods is generally disfavored by the courts, however.

The Moral Revisited

If your computer fails and the warranties arising out of its purchase have not been disclaimed, do not think that you can automatically recover damages. There may be other factual and legal hurdles to overcome. But knowing what you have agreed to and understanding the legal obligations of that agreement are necessary first steps. There is no substitute for reading and understanding all of the provisions of any agreement you sign. Your failure to do so can result in the loss of important legal remedies available to you.

THE AGE

The Land of Altair

Imagine a Land where computers are in the hands of the people. Creative people from farmers to merchants to engineers to housewives to dentists to poets.
Imagine a Land where the computer is in harmony with man with nature with hope with peace.
Imagine a Land where computer power is affordable and accessible and understandable to almost everyone.
You are imagining the Land of Altair.
The Land of Altair is now.

THE LAND OF ALTAIR *BY DAVID BUNNELL first appeared in the September 1975 issue of* Scientific American *as part of a 2-page advertisement announcing the world's first personal computer, the* Altair 8800.

The Altair and its history is in most respects synonymous with the early history of personal computing. Mits, the little company in Albuquerque, New Mexico, which proclaimed to Scientific American readers that they had invented a product which was going to change the world history for all time, went through a dizzy success cycle and then sputtered to an ignominious non-existence.

Along the way, folks at Mits created or inspired virtually every component of the personal computer market (see following page). David Bunnell, the publisher of PC, *was the Vice President of Advertising at Mits, and Eddie Currie was the Chief Executive Vice President. Together in this series they tell the story of* The Age of Altair.

OF ALTAIR

David Bunnell and Eddie Currie

PART ONE:

The Quiet Revolution

THE PERSONAL COMPUTING AGE HAS been in a continual dynamic state since its beginning in 1975 with the introduction of the Altair microcomputer.

The Altair was a neatly designed "expandable" computer in a sky blue metal box with rows of flashing red lights. Interestingly enough, the Altair, which was the first commercially available computer to be designed with a single microprocessor chip for its brains or "CPU," didn't come from California's Silicon Valley—spawning ground of micro chip companies—or Boston's Route 128—where "minicomputers" were born. Instead, it came from Albuquerque, an unlikely desert town known mostly for its turquoise jewelry and Mexican restaurants.

Though not many realize it, almost every aspect of the personal computer industry had its beginning with this single development. This included the first computer to ever be offered in kit form, the first personal computer BASIC and other high level languages, the first personal computer retail stores, the first personal computer convention, the first personal computer publication, and the first software publisher for micros.

In 1975 more Altairs were sold than any other single model of computer as it took its place in history as the first of the so-called "affordable computers."

Yet, the Altair Age began quietly with few of its participants realizing that it would spawn several hundred new companies, nearly a hundred publications, a dealer network of thousands, and an installed base of literally hundreds of thousands of personal computers throughout the world, and employment for millions.

How could one have guessed that the Altair computer and its knockoffs known as "S100 Bus" machines would be proved capable of compiling virtually every language available for computers of any type, playing games, music composition and production, splendid graphics, teaching its owner a wide variety of skills, linking up with other micros around the world via the ordinary telephone line, speech recognition and speech simulation—not to mention myriad other activities.

The Altair Age was the creation of one man, Ed Roberts, a former Air Force engineer stationed in Albuquerque who upon leaving the service started his own electronic development company—which he first called M.I.T.S. for Micro Instrumentation and Telemetry Systems. Upon incorporating a year later he shortened it to Mits, Inc.

Though Roberts began his company by designing a hobbyist model rocket, he soon moved into scientific test equipment and then into both pocket and desktop electronic calculators.

Roberts designed the Altair with 16 card slots (the PC has 5) and, as IBM has done, he designed the plug-in structure to be easily accessible to third party vendors and computer hobbyists.

Roberts' goal was to provide a "real computer" to the masses much in the spirit of Henry Ford. This computer was basic and minimal. But it was made from standard multiple source components and it used the spiffy new 8-bit Intel chip, the 8080. Costing under $400 in its minimal configuration of 256 chamsters of memory (and that's not "K")—the Altair was a real computer. It was infinitely expandable and best of it, it worked.

The Altair story has many twists and turns. Each time this revolution has appeared to stabilize, another new development has sent it hurtling forward again; whether it's the introduction of the Z80 or the 8086 or the 68000, or the advent of the mini-Winchester, the momentum is continuing to build.

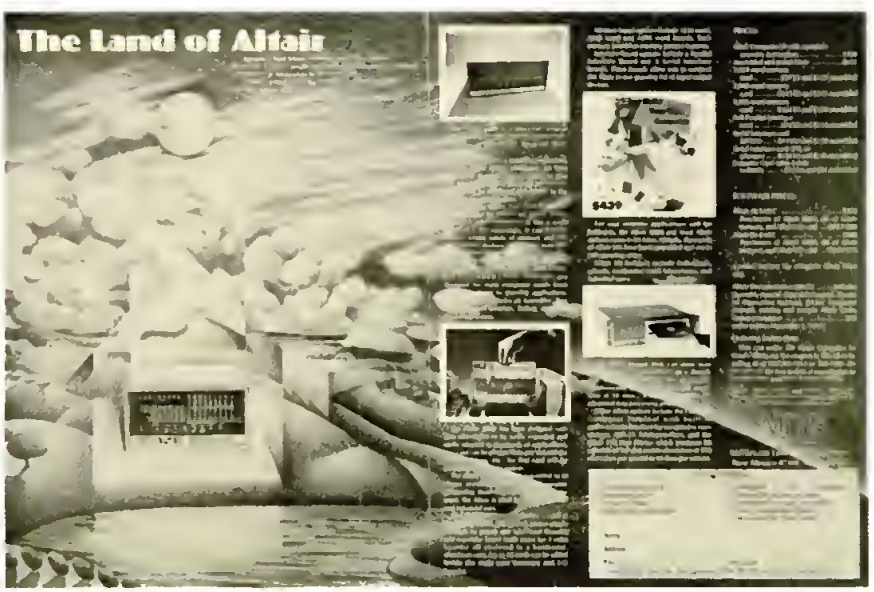
Just as we began to suspect that there is a clear view of the future at hand, perhaps the most significant event of the decade occurs.

IBM enters the market with the IBM Personal Computer. This machine, with its powerful 8088 microprocessor, with enough internal memory to contain an entire floppy, clearly marks the beginning of a new era.

From our perspective, a tremendously significant event has once again begun without much fanfare and with relatively little attention from the media.

As significant as the Apple and Radio Shack computers have been in proving that there is indeed a big market out there for micros, the IBM ranks right up there—with the Altair. The reason is that as IBM PC sales mount up into hundreds of thousands, and then millions, IBM will polish up the personal computing market that the Mits Altair originally created.

Next Month: THE ELECTRONIC COWBOYS FROM ALBUQUERQUE



Leading the way...

. . . in game accessories for the IBM® Personal Computer. TG Products is the leading supplier of game accessories for the Apple® Computer. The same high quality and reliability that has made TG Products a leader in Apple® accessories goes into each new IBM® Personal Computer accessory. Be a winner with TG Products.

TG JOYSTICK $64.95

Apple is a Reg. TM of Apple Computers, Inc.
IBM is a Reg. TM of International Business Machines Corp.

Shipping Address:
1104 Summit Avenue
Suite 106
Plano, Texas 75074

TG PRODUCTS
P.O. BOX 2931
RICHARDSON, TX. 75080

214 / 424-8568

WORDSTAR MADE EASY

A GOOD USER'S MANUAL FOR A COMPUTER product ought to be designed attractively. It ought to be easy to use, to put the reader at ease and eliminate some of the anxiety attendant upon learning something new. Certainly it should provide a useful index and offer some gentle introduction (such as a glossary) to all the new terms and concepts it contains. Unfortunateiy, the manual that MicroPro supplies with its WordStar word processing program has none of these attributes. The WordStar manual is loaded with information about the complex and varied features of this program, but it does not offer an easy way in.

WordStar is currently being adapted for use on the IBM Personal Computer, and this powerful program will add a welcome dimension to word processing for PC users. Even more welcome, though, is the new book *WordStar Made Easy,* by Walter Ettlin, published this month by Osborne/McGraw-Hill. *WME* is not the last word in documentation, but is a quantum improvement over the MicroPro manual, which can quickly overwhelm readers with its dense format and type-crowded pages.

Unlike the MicroPro manual, Ettlin's guide has an index, an eye-pleasing format with ample white space on the pages, and an intelligent organization. The fourteen lessons in *WME* cover groups of related commands, and the paragraph or two devoted to each keystroke is headed in boldface type with that command. Therefore, a glance at any page in the book will quickly disclose which commands are covered on that page.

Ettlin's book is about half as long as the MicroPro manual for WordStar, and some information is sacrificed in achieving this more manageable length. The author quite rightly regards his work as an accompaniment to the MicroPro manual, however, intending that *WME* be used routinely, with the longer manual for reference when necessary. As an aid to this two-book system, *WME* has page numbers in the margins that refer to locations in all versions of the MicroPro manual where related information may be found.

There are deficiencies in *WordStar Made Easy,* however. The index is not very comprehensive, and it is not cross-referenced. This diminishes the utility of the index and at times can be misleading. For example, the author refers to the process of lining up the margin (usually on the right) so that every line ends at the same column, as "reforming." He uses this term in the index but does not list any of the more common alternatives, such as "justification" or "alignment."

One solution to this problem would be to have a complete glossary, including every term that a beginning user might not know. It is difficult for an expert to imagine what a novice knows or does not know. We become "experts" very quickly, in our own estimation, and soon forget that once we thought that a "menu" was nothing but a list of available dishes to eat and "prompt" was not a noun, but an adjective meaning on time. Yet every document that might be used by someone unfamiliar with a given system, or with computers in general, ought to have a good glossary.

Of course, none of this would matter if every user were content to follow *WME* slavishly, step by step, from beginning to end, and compose his or her own index/glossary while going along. And here we come to the most fundamental criticism not only of *WME,* but of all documentation of this sort that I have seen. It does not allow sufficiently for the way real people actually learn a new software package in the real world, which is by playing with it. Let me take my own advice and explain what I mean by "playing."

Upon first sitting down with a new software package, I find it impossible to follow a manual or tutorial very far without thinking of some operation that I just must learn how to perform right now, no matter that the manual does not get to it until page 106. I usually try to figure it out and sometimes succeed, especially with the use of a help menu, but I often fail. In the process, I always learn something about the system.

When I'm finished with such a digression I return to the manual, taking up its instructional sequence where I left off. I cannot learn any other way, and I believe that most people learn by this method; that is, by following their own curiosity. Curiosity is the only reliable educational motivation, and any manual that forces a student into a preconceived and inflexible learning sequence not only violates the student's individuality, but forfeits the aid of curiosity, turning the student from an ally into an antagonist.

A comprehensive glossary and a cross-referenced index are the two most important means of avoiding this mistake. Third most important is adopting a style that conveys the learner that he or she may indulge a freedom to "play." Rather than say, as Ettlin does in several places, words to the effect that "we'll cover this subject further in a later chapter," he might better have said, "If you want to pursue this train of thought, feel free to go to chapter such and such right now, or see index references x, y and z."

—Les Cowan

WORDSTAR MADE EASY, by Walter Ettlin
Osborne/McGraw-Hill, 124 pages, $7.95

Second Opinions

To me, the principal strength of *WordStar Made Easy* is that it gives readers a series of projects with which to learn WordStar. There is no substitute for learning by doing, and Ettlin provides several different types of documents for users to learn with: simple paragraphs, form letters, pages with internal lists and special indentations, and even examples of charts and elementary graphics. When you've completed WME's exercises and examples, you will have used most of the features and commands WordStar contains, and—more important—you will have some ideas about how to apply them in business situations.

WordStar Made Easy is a great help to anyone who is exchanging a typewriter for a computer, and it certainly makes mastery of WordStar's varied components simpler than either the manual supplied by MicroPro or Les Cowan's preferred learn-by-experimentation method. Both experimentation and the WordStar manual are essential parts of the full learning process—it's just that Walter Ettlin has made it easier for all of us to get started.

—Jeremy Joan Hewes

NEW ON THE MARKET

SOFTWARE

Arithmetic Games

IBM has announced three arithmetic programs in its Personal Computer Education Series. They are *Fact Track* ($90), which assists students in learning basic arithmetic, and *Arithmetic Games*, Set 1 and Set 2 ($60 each), which build mathematics and logic skills in game playing situations. *Fact Track* measures mastery of single-digit addition and multiplication in two ways—by correct answer and rate of response. All three programs are by Science Research Associates, and are available now through PC dealers.

International Business Machines Corp., P.O. Box 1328, Boca Raton, FL 33432. 800/447-4700; in Illinnis, 800/332-4400.

Typing Tutor

A touch-typing instruction and drill program that creates individualized typing drills has also been added to IBM's Education Series. *Typing Tutor* ($25), from Microsoft, Inc., automatically adjusts to the user's skill level each time it is used.

IBM, (see above).

Small Business Accounting

General Accounting ($425), a program package by BPI Systems, Inc., will be available in February for use by small businesses and professionals. Once the user makes journal entries into the system, it can automatically post ledgers, prepare financial statements and close the user's books.

IBM, (see above).

Languages Galore . . .

IBM has also announced expansion of its Computer Language Series for the PC. First of the new products will be *Macro Assembler*, to be ready in February, and *FORTRAN Compiler*, coming in March; both run under PC DOS and are by Microsoft, Inc.

A later addition to the Series will be the *UCSD p-System* ($625 with one language), an advanced operating system which functions with both *UCSD Pascal* ($175 separately) and *FORTRAN-77* (also $175). The p-System and associated languages, both from SofTech Microsystems, will be released in April. Included with the p-System are a screen-oriented editor, a macro-assembler, and advanced "turtlegraphics" for graphic displays.

IBM, (see above).

BASIC Utilities

A set of utility programs for BASIC programmers, including subroutines for formatted input, matrix input and arithmetic, line drawing and file searching, has been released by Basic Business Software, of Las Vegas. The *BASIC Utilities* disk ($75) also contains a program for cross-referencing, and similar aids.

Basic Business Software, Inc.—P.O. Box 26311, Las Vegas, NV 89126—702/876-9493.

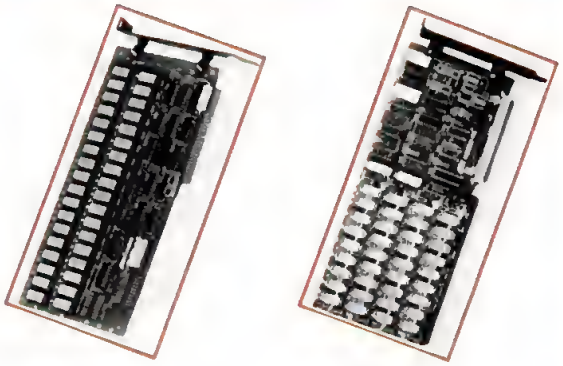
"Common BASIC Programs" etc.

Adaptations for the IBM PC of the programs contained in the book *Some Common Basic Programs* (Osborne/McGraw-Hill) are being offered by Basic Business Software. The disk is $35. The same company is also offering PC programs for *Plotting* ($75—it plots an array of data points to any printer, *Amortization & Depreciation* ($30) and *Finance Calculator* ($30).

Basic Business Software, Inc., see above.

HARDWARE

Several Companies Announce Memory Boards



In addition to the 192K memory expansion board now being produced by Intermedia Systems (see related story in this issue), two other California firms have announced the availability of memory boards with varying capacities. Datamac Computer Systems of Sunnyvale offers an expansion board that can be configured for 64K, 128K, 192K, and 256K bytes of memory, with parity. The price of Datamac's 64K expansion unit is $499, and the larger memory units are comparably priced; the board is available now.

Datamac Computer Systems, 680 Almanor Ave., Sunnyvale, CA 94066; (408) 735-0323.

A.S.T. Research, Inc., of Irvine also offers memory expansion boards with capacities of 64K, 128K, 192K, and 256K in one unit, with full parity checking. The firm offers a one-year warranty on these boards, which are priced from $495 to $1595.

A.S.T. Research, Inc., 17925 Sky Park Circle, Suite B, Irvine, CA 92714; (714) 540-1333.

Communications and Development Modules

Two hardware products also offered by A.S.T. Research are a communications option card that contains two RS232 ports that can support asynchronous, bisynchronous, SDLC, and HDLC protocols, and a Wire-wrap/Extender card set for PC users who are doing hardware development.

A.S.T. Research, (see above).

PERIPHERALS

8-inch Compatability for the PC

INSTOR Corporation has developed INSTOR/801, a floppy disk for the PC that uses the IBM Diskette i Basic Data Exchange format. With this device and the PC's Asynchronous Communications Adaptor, the PC can read and write an 8-inch IBM 3741 format disk.

The 801 interfaces through the PC's serial (RS232) port and, using software provided with the product, can transmit data into the PC's memory (for subsequent writing on PC disk) or receive data from the PC and write it on the

continued next page. . .

3741 format disk. Thus, the INSTOR 01 provides compatability between the PC and some 25 other computers that utilize IBM 3741 format disks. This disk exchange system is priced at $2,000, including necessary software.
INSTOR Corporation, 175 Jefferson Drive, Menlo Park, CA 94025; (415) 326-9830.

Multi-font Typographic Printer

The Model 700 typographic printer ($3,360) by Sanders Technology can print draft copy at high speed, then print a final version in multiple typefaces that come close to typeset quality. Many mechanical parts are common with the Diablo 630 daisy-wheel printer, and the Model 700D, due for March release, will be compatible with the Diablo 630's software control codes. Six different type styles or sizes can be installed in the printer, which also has plug-in slots for four additional draft/finish sets ($125 each). The printer can be set by switches for all common computer interfaces.
Sanders Technology, Box 1226, Nashua, NH 03061, 603/882-1000.

Chronograph for Date and Time

The "stack" modem from Hayes Microcomputer Products, Inc. of Norcross, Georgia now has a matching companion—the Hayes Stack Chronograph, a calendar/clock that can be attached to the PC through an RS232 port. In addition to providing accurate timekeeping, users may develop software to log programs and data according to time and date and to send instructions to the computer to control security devices such as lights, burglar alarms or sprinkler systems.
Hayes Microcomputer Products, Inc., 5835 Peachtree Corners East, Norcross, GA 39902; (404) 449-8791.

Graphics Printer

Centronics Data Computer Corporation has announced production of the Model 739 printer, which is capable of both graphics and conventional text printing. Text is produced in a 7x8 dot matrix at speeds of 100 characters per second (regular letter spacing) and 80 cps (proportional spacing.) Graphics are printed at a resolution of 74 dots per inch by 72 dots per inch. The Centronics 739 can take sheet, fanfold or roll paper up to 9 inches wide (including pin feed), features a self-test, and comes in both parallel and serial models. This printer costs less than $1000.
Centronics Data Computer Corporation, Hudson, New Hampshire 03051; (603) 883-0111.

BOOKS

Guide to Inventory Management

Retailers who are using or are contemplating use of a computer for inventory control will find welcome guidance in *Inventory Management for Small Computers,* by Chuck Atkinson, just published by dilithium Press. The author owns a sailing business and wrote this book after designing his own inventory system. Atkinson's program, listed in the book, features records of stock on hand, prices, and automatic posting of items sold to the general inventory list as a sales receipt is printed.
Inventory Management for Small Computers, by Chuck Atkinson, 120 pages, $12.95; Dilithium Press, 11000 S.W. 11th St., Suite E, Beaverton, OR 97005; (503) 646-2713.

PC Overview

A book titled IBM's Personal Computer ($14.95) has been published by Que Corporation. The team-written book offers an overview of the microcomputer market and where the PC fits into it, and analyzes its hardware and software components on an item-by-item basis.
Que Corp., Indianapolis, IN 317/842-7162.

EVENTS

Computer Swap

The high tech flea market will become a nationwide event in the coming year, according to John Craig, originator of Computer Swap America. Craig will take his swap meet, which has been based in the San Francisco Bay Area, to southern California on Saturday, February 6th at the Orange County Fairgrounds in Costa Mesa. The event will return to northern California on April 24th, at the Santa Clara County Fairgrounds in San Jose. The most recent swap meet, held in San Jose last October, drew more than 5,000 people.
Computer Swap America, P.O. Box 52, Palo Alto, CA 94302; (415) 494-6862.

COMING UP

Visi-Clones

A PC-Lab comparative report on "spreadsheet" programs, including the original, *VisiCalc*, plus *SuperCalc*, *Multiplan* and other pretenders to the throne.

Inside IBM

PC visits the PC's birthplace in Boca Raton, Florida, for a first-hand report on the how-and-whys of the IBM Personal Computer. Don Estridge, the IBM executive in charge of the Personal Computer program, shares insight into the PC's design in an exclusive *PC* interview. Also: A peek at the soon-to-open new PC factory and what it bodes for the PC's future.

More From Microsoft

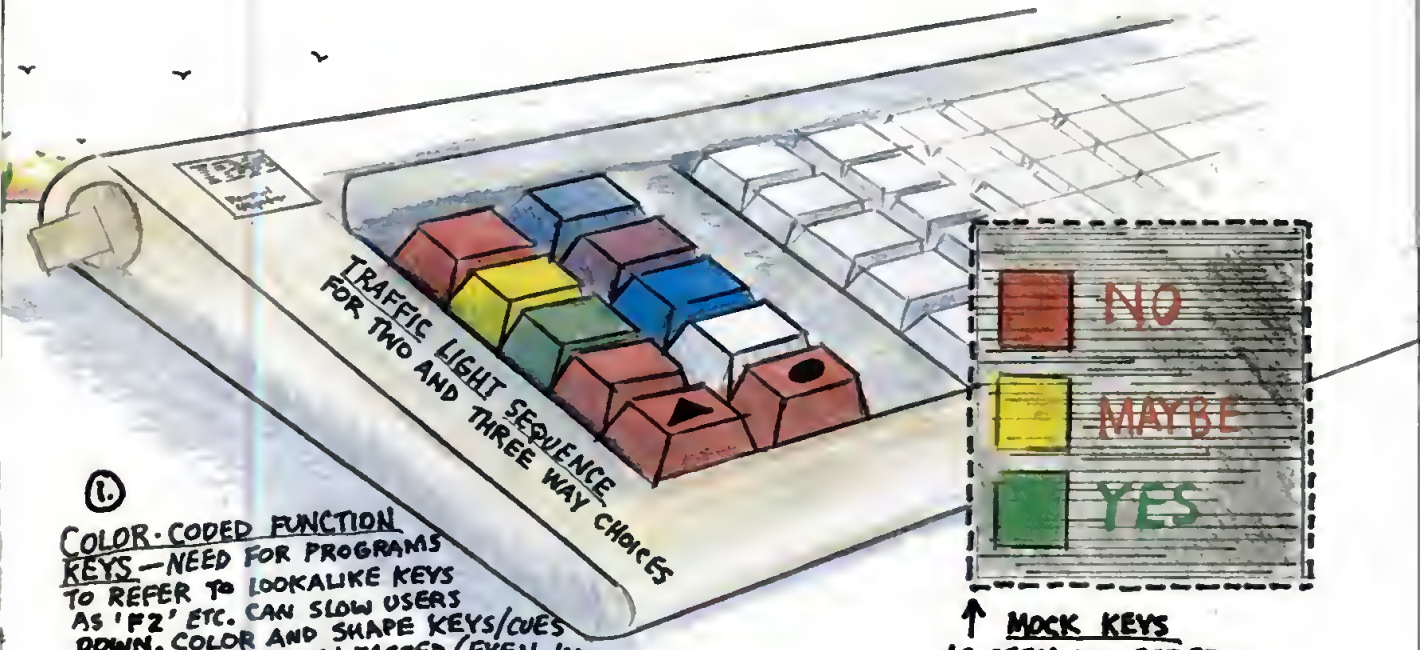
To follow up this issue's interview with Bill Gates, *PC* talks with Vern Raburn, President of Microsoft Consumer Products, a division of Microsoft. His views on future trends in application software are of particular interest to *PC* readers, since Microsoft will undoubtedly continue to supply programs for the IBM Personal Computer.

Plus...

Taking The Measure—Part 2 . . . Color Monitor Test . . . more Product Reports . . . new product news . . . a *PC Profile* . . . and lots more.

Index To Advertisers

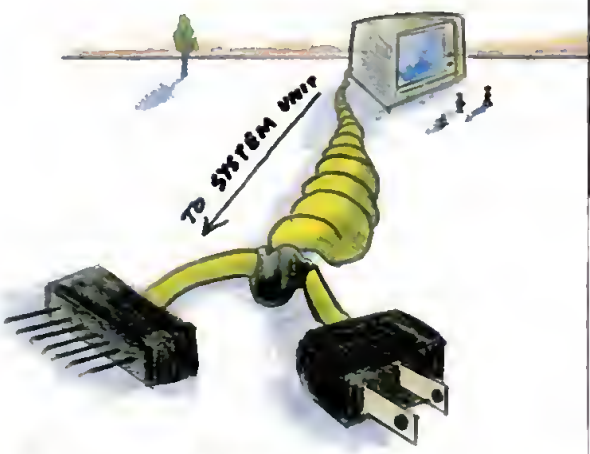
wish list™



1. COLOR-CODED FUNCTION KEYS—NEED FOR PROGRAMS TO REFER TO LOOKALIKE KEYS AS 'F2' ETC. CAN SLOW USERS DOWN. COLOR AND SHAPE KEYS/CUES WOULD WORK MUCH FASTER (EVEN IN MONOCHROME, BY USING COLOR NAMES).

↑ MOCK KEYS AS SEEN ON SCREEN.

2. STICK ON LABELS FOR PLUG-IN HARD WARE... PROVIDED WITH CIRCUIT BOARDS WOULD STICK ON BACK OF COMPUTER TO IDENTIFY WHAT'S INSIDE.



3. COILED, LONGER CORD FOR MONITOR ...MATCHES KEYBORD CORD. COMBINED POWER AND VIDEO CORD WOULD MAIN TAIN AESTHETICS AND GIVE FLEXIBILITY IN LOCATION.

PC invites readers to contribute Wish List ideas for publication. Any product, service or design idea you'd like to see for IBM Personal Computers is fair game for *PC*'s Wish List feature. Ideas selected for publication will be illustrated by *PC*'s artist. *PC* will pay $25 for the featured Wish List idea used in each issue, $10 for other ideas awarded Honorable Mention. All published ideas will be credited to the person or organization submitting them, and become the property of *PC*. In case of duplicate submissions, any award will go to the entry with the earliest postmark.

Send Wish List ideas—a description, sketch or both - together with your name, address and phone number to *PC* Wish List, 1239 21st Avenue, San Francisco, California 94122. Sorry, we can't discuss the Wish List feature by telephone.

REMEMBER.

Elephant™ floppies.
They're guaranteed to meet or beat every industry standard for quality. They come standard with reinforced hub rings at no extra cost. They come in every popular 5¼"model, in both hard and soft sector. And they sell at some of the lowest prices in the business.
Elephant Flexible Disks.
They're heavy duty. They work for peanuts.
They never forget. Get yourself a trunkful.

HEAVY DUTY DISKS.

Distributed Exclusively by **Leading Edge Products, Inc.**, 225 Turnpike Street, Canton, Massachusetts 02021
Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

The IBM Personal Computer

Personal, Professional, Technical — or somewhere in between ... PC-MATE™ makes the IBM Personal Computer a perfect match

PC-MATE™ from TECMAR is the first and only complete expansion series available for the IBM Personal Computer. There are currently more than twenty PC-MATE™ expansion options available, and new products are continuously added to the list.

When you want more from your IBM Personal Computer, look to PC-MATE™.

You can create a SUPER PERSONAL COMPUTER with household lights and appliance control, voice output, and give it more memory than any ordinary personal can handle.

Or make it a PROFITABLE PROFESSIONAL SYSTEM with expansion space and a Winchester disk to handle more business accounts. Increase memory up to the system limit and process those accounts faster. Add flexible I/O interfaces and put yourself on line to outside information sources.

As an INTELLIGENT LABORATORY TOOL with interfaces to IEEE 488 instrumentation, analog signals, stepper motors and video signals, your IBM Personal Computer becomes the perfect workbench assistant.

Hardware, Software, Accessories — PC-MATE™ provides the highest quality and the greatest possible range of functionality for the IBM user.

Ask your local computer store for more information on the PC-MATE™ series from TECMAR, or call for the name of your nearest authorized PC-MATE™ dealer.

PC-MATE™ EXPANSION OPTIONS

Personal Computer Expansion Chassis (see photo)
192K and 259K Dynamic Memory with Parity
Winchester Disk Drive and Controller
Parallel Medium Speed Input/Output Interface
Serial Medium Speed Input/Output Interface
Parallel High Speed Input/Output Interface
Serial High Speed Input/Output Interface
Analog to Digital Converter - 8, 12, 14, 16 Bit
Dust Cover Set for IBM PC and Peripherals
High Speed Static Memory (RAM/ROM)
Digital to Analog Converter - 8 and 12 Bit
Multi-System Printer Sharing Facility
CMOS Memory with Battery Backup
System Clock with Battery Backup
Electrically Erasable EPROM
BSR X-10 Device Controller
Stepping Motor Controller
Video Image Digitizer
IEEE 488 Interface
Prototyping Board
Music Synthesizer
Voice Synthesizer
Extender Board

One Year Warranty

Additional products are already under development, so if we don't have what you need, chances are good that we soon will.

Tecmar Inc. PERSONAL COMPUTER PRODUCTS DIVISION
23600 Mercantile Rd., Cleveland, OH 44122 (216) 464-7410